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THE WILSON BULLETIN

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THE WILSON BULLETIN

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Mockingbird (Mimus polyglottos) flashing its wings. Photographed by Ralph E. Lawrence at Arlington, Virginia, March 22, 1947.

THE MOCKINGBIRD'S WING-FLASHING *

BY FRANCIS H. ALLEN

A RECENT paper by Dr. Sutton (1946) on wing-flashing in the Mockingbird (*Mimus polyglottos*) interested me especially because I lived on rather intimate terms with a pair of Mockingbirds here in West Roxbury, near Boston, in the season of 1909 and then first witnessed the wing-flashing on my lawn. A male Mockingbird spent the winter of 1908-1909 on and about our place and was joined by a female about April 1. From then on the pair were constantly seen in the neighborhood and frequently fed on our lawn, but it was not till June 6, when they had young in the nest, that I saw the behavior in question. To quote from my notes (June 6, 1909): "I saw for the first time today the curious spreading of the wings by the bird as he hunts his food—or food for his young—on the lawn. The wings are lifted rather deliberately and thrust out from the shoulder, I should say, but are kept at an angle of about 90 degrees. It is a deliberate, not at all a nervous, motion, and I think it may well be for the purpose of flushing insects in the grass by a show of the white areas, as a correspondent of Mrs. Miller's suggests (*In Nesting Time*). My wife had seen the act three or four days ago. This is undoubtedly since the hatching of the young, and the habit may be correlated with the necessity of increased activity in hunting insects."

The four young left the nest June 12, and on June 22 I saw three of them running about on the lawn and feeding. They jetted their tails and acted like full-grown birds, though their tails were still short. The parents were still feeding them. On June 23 I "saw one of the young opening its wings and closing them as it stood on the lawn, after the fashion of the parent bird as described under date of June 6."

The passage from Mrs. Miller ** referred to in my notes reads as follows: "At the end of a run he lifts his wings, opening them wide, displaying their whole breadth, which makes him look like a gigantic butterfly, then instantly lowers his head and runs again, generally picking up something as he stops. A correspondent in South Carolina, familiar with the ways of the bird, suggests that his object is to startle

* We are particularly pleased to publish in connection with this article by Mr. Allen what is, we believe, the first published photograph of a Mockingbird flashing its wings. It is interesting to compare the photograph with the painting by George M. Sutton reproduced in the December 1946 *Bulletin* (Plate 8) and with the painting, apparently the first representation of the wing-flashing behavior, by Roger Tory Peterson, published in *Life* for April 8, 1946, page 74.—Ed.

** Mrs. Harriet Mann Miller, who wrote under the pen name of Olive Thorne Miller, is not so well known to the younger generation of ornithologists as she ought to be, but she was a careful observer and a conscientious recorder of her observations of the intimate life of many American birds.—F.H.A.

the grasshoppers, or, as he expresses it, to 'flush his game.' I watched very closely and could not fix upon any theory more plausible, though it seemed to be weakened by the fact that the nestlings, as mentioned above, did the same thing before they thought of looking for food. The custom is not invariable; sometimes it is done, and sometimes not" (Olive Thorne Miller, 1888:60). The reference to the "nestlings" is explained by an earlier description (p. 52) of the first movement of a young bird on the ground after fluttering out of the nest: "I saw his first movement, which was a hop, and, what surprised and delighted me, accompanied by a peculiar lifting of the wings. . . ." And again (p. 54), of another fledgling: "He raised himself upon his shaky little legs, cried out, and started off exactly as number one had done,—westward, hopping, and lifting his wings at every step."

Dr. Sutton's suggested explanation of the wing-flashing behavior of the Mockingbird is an interesting one and has some good evidence to back it. Perhaps my own observation of a single pair and their young, far beyond the species' normal range, does not justify the doubts I own to, but nevertheless I have them—and for these reasons: (a) The behavior, as I noted at the time, appeared to be a deliberate, not a nervous, motion, such as would be expected if it indicated "wariness, suspicion, distrust." (b) I noticed nothing at the time to suggest that there was any ground for suspicion on the bird's part. (c) Though the pair had haunted our lawn ever since it became a good feeding ground in the spring, it was not till the young were hatched in June that this behavior was seen. (d) The necessity for increased insect-gathering activity after the hatching of the young might well have prompted a change of behavior.

This brings us back to the theory that this behavior is of use in getting food, but I have another suggestion to make on how it may operate. Dr. Joseph Grinnell (1924) showed how the white of the under parts of birds might be useful in lighting up the crevices where food was to be found. And everyone knows how the reflection of light from a sheet of white paper or even the open hand can help to illuminate a dark spot. Why could not the flash of white from the Mockingbird's wings serve that purpose in the grass of a lawn or field? In that way, sluggish prey could be detected and captured, while the more active prey would be startled into betraying themselves by motion. Some of Mrs. Laskey's observations, as reported by Dr. Sutton, seem to show that the wing-flashing was used especially in dark situations and when the bird was scrutinizing its surroundings carefully—that is, in circumstances where additional light would be of service.

The young bird that I saw flashing was of an age to feed itself and may have acquired the habit through imitation of its parents, but the behavior, whatever end it may serve, is more probably instinctive.

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215 La Grange Street, West Roxbury 32, Massachusetts

THE SNOWY OWL MIGRATION OF 1945-46

SECOND REPORT OF THE SNOWY OWL COMMITTEE
PREPARED BY L. L. SNYDER

THE Committee's procedure in gathering data on the flight of Snowy Owls (*Nyctea scandiaca*) in the winter of 1945–46 has been essentially the same as that described in its first report, The Snowy Owl Migration of 1941-42 (1943. *Wils. Bull.*, 55:8–10). The Committee submitted the following questions to cooperators: *When were Snowy Owls first noted in your area during the current autumn and winter? At what period were they most plentiful? What was the total number of owls noted? How many were known to have been killed?* Literally thousands of people, directly or indirectly, contributed to this report, and the Committee takes this opportunity to thank them for their interest and aid. Certain changes in the Committee's personnel have taken place since our first report. The list of members is as follows: *British Columbia,* J. A. Munro, Okanagan, B. C.; *Prairie Provinces,* B. W. Cartwright, 201 Bank of Commerce Chambers, Winnipeg, Manitoba; J. D. Soper; *Ontario,* L. L. Snyder (Chairman), Royal Ontario Museum, Toronto; T. M. Shortt; O. H. Hewitt; *Quebec,* V. C. Wynne-Edwards (now resigned); *Maritime Provinces,* R. W. Tufts, Wolfville, N. S.; *Newfoundland,* H. S. Peters, 54 Folly Rd., Charleston, S. C.; *New England States* (and, tentatively, *Pennsylvania*), A. O. Gross, Bowdoin College, Brunswick, Maine; *Washington, D. C., region,* F. C. Lincoln, Fish and Wildlife Service, Washington, D. C.; *New York State,* G. M. Meade, Trudeau Sanatorium, Trudeau, N. Y.; *Ohio,* L. E. Hicks, Ohio State University, Columbus, Ohio; *Michigan,* C. T. Black, Dept. of Conservation, Lansing; J. Van Tyne; *Central, Western and Northwestern States,* O. S. Pettingill, Jr., Carleton College, Northfield, Minn.

Observers are invited to assist in future surveys by forwarding records to the geographically appropriate committee member. It will be apparent from the list that some sections of the continent are unrepresented or inadequately represented on the Committee; volunteers to organize future surveys in each of several political areas are needed, for example, in Quebec, New Jersey, Pennsylvania, Indiana, Illinois, Wisconsin, the Dakotas, and States of the Northwest.

It is the Committee's object to report briefly on periodic major flights of Snowy Owls from the Arctic to southern, settled parts of the continent. Following the major flight of 1941-42, there was a small flight in the east in the fall and winter of 1942-43; as during the 1941-42 flight, occurrence in the west seemed to be the normal invasion by the species of the Prairie Provinces which takes place prac-

tically every fall and winter. (These facts were determined through routine channels, the Committee taking no collective action that year to gather data through questionnaires.)

Presumably the basic condition for any flight in the east, or a major influx in the west, is an unbalance in the Arctic between the Snowy Owl population and its food supply. It is to be expected that a second migration will occur in the succeeding year if unbalance still exists. The second flight of two in annual sequence would involve fewer owls if their population had suffered depletion, or if a partial correction of unbalance in the owl-food relationship had occurred in the Arctic.

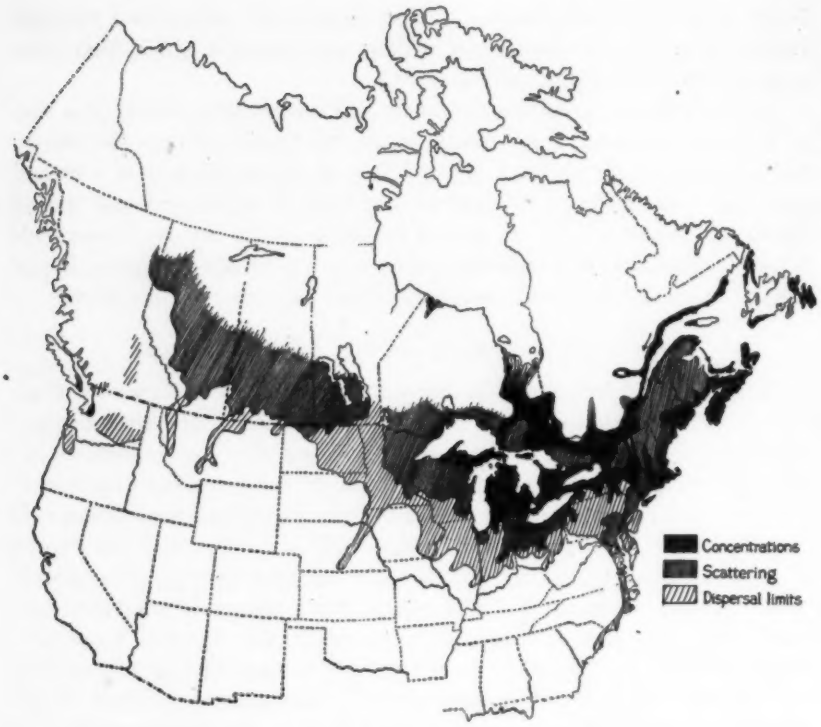
Timing and Velocity of the 1945-46 Flight

It became evident early in the autumn of 1945 that Snowy Owls were invading settled parts of eastern North America and that a heavy influx was a probability in the west. Consequently, the Committee began gathering data on the flight. Records were sought throughout the transcontinental area over which previous flights were known to have spread. Our organization is obviously imperfect and the results of its work correspondingly so. We can be sure that proportionately more owls are observed in areas where there are more observers, and that some areas are inadequately surveyed. But general knowledge makes possible an approach to correct evaluation of regional reports.

The earliest reported occurrence of a migrant Snowy Owl in the autumn of 1945 came from the eastern part of the continent, namely Kezar Falls, Maine, on September 15. Incidentally, this appears to be the earliest (seasonal) occurrence in the history of Snowy Owl flights in New England. The next record was for September 20, at Stratton, Maine. Additional September records (without exact dates) came from Clova, southern Quebec; Biscotasing, central Ontario; and Thessalon (on the North Channel of Lake Huron), Algoma District, Ontario. Other first occurrences in the east that demonstrate the progressive spread of forerunners of the flight are: Manitou Island (in Lake Superior, off Keweenaw Point), Michigan, October 1; East Saugatuck, southwestern Michigan, "early October"; Sioux Lookout, western Ontario, October 9; Winthrop, Massachusetts, October 10; Two Creeks, Wisconsin, "early October"; northern counties of New York, October 20; Monroe County, southeastern Michigan, October 23; northern Ohio, October 30.

Forerunners of the flight in settled parts of the west were recorded on later dates than in the east. First occurrences reported are as follows: Lenore, southern Manitoba, October 4; Weyburn, southeastern Saskatchewan, October 4; Calgary, southern Alberta, October 9; Bottineau, North Dakota, October 14.

Over a period, varying with the district, from six weeks to more than two months, there was a gradual increase in the number of re-



Map 1. Snowy Owl flight of 1945-46.

gional first-appearance reports and in the number of owls observed within each of the several sub-regions, both eastern and western. Estimates of peak periods in the sub-regions are as follows: Maine, last week of November; Massachusetts, first week of December; southern Quebec, late November; New York State, first week of December; central Ontario, mid-November; southern Ontario, late November to early December; northern Michigan, mid-November; southern Michigan, early December; Minnesota, latter half of November; southern Manitoba, late December; southern Saskatchewan, late December; southern Alberta, late December.

The limits of the flight of 1945-46, reached in the form of spurs, or outlying "islands," were as follows: one, Charleston, South Carolina, January 24; one, Lawrence County, Ohio (no date); one, Ripley County, Indiana (no date); one, Clay County, Illinois (January?); one, near Springfield, Illinois, January 27; one, Hancock County, Illinois, December 16; one, Ottumwa, Iowa, February 22; one, 18 miles southwest of Hastings, Nebraska, February 17; and occurrences (particulars unknown) in southwestern Montana (mid-November), southeastern Washington (November 30), and northwestern Oregon (mid-

November). A number of reports of Snowy Owls boarding ships at sea were received; one such occurrence was "320 miles off Newfoundland."

Numbers and Mortality

The migration of 1945-46 may have involved more owls than any flight on record. Gross (1927. *Auk* 44:479–493) reported a total of 2,363 owls for 21 States during the great flight of 1926-27. The Committee's total for the same 21 States during the 1945-46 flight is 7,280. However, we cannot be certain that the 1945-46 flight actually involved approximately three times as many owls as the 1926-27 flight, since the compilation of records for the earlier flight was a one-man effort.

The grand total of Snowy Owl occurrences compiled by the Committee for the 1945-46 flight is 14,409, of which 4,475 were reported killed. In all probability the mortality would be considerably higher than the approximate one-out-of-three ratio indicated, since an owl killed is automatically removed from further tallying, but a live owl may be counted more than once. The highest mortality record came from New York State, where 839 owls were killed out of 1,104 reported, or approximately three out of four. But here again no great stress should be placed on the figures, since the compilation of records in New York State rested largely on reports from taxidermists. Further, it appeared from the reports to the Committee that a smaller proportion of owls are killed in the west than in the east.

Perhaps the most that can be said on the basis of our statistics is that the destruction of Snowy Owls on this flight, as in previous flights, was heavy. Since the history of Snowy Owl flights suggests that the species has been repeatedly subjected to heavy destruction while wintering in southern latitudes, and yet the last flight appears to be the largest on record, it is obvious that the Snowy Owl population can withstand such treatment.

Direction of Flight and Distribution

The main source of the migrating owls was again apparently the eastern Arctic, from the Boothia Peninsula through Baffin Island and the northern portion of Ungava. Practically all of the Hudson's Bay Company representatives at posts in this region noted an increase in Snowy Owls in their 1944-45 reports and a reduction (an exodus) in their November 1945 reports. There was but slight indication of increase in numbers at this period in the western Arctic, on western Victoria Island, and at the western end of Coronation Gulf.

In general, the flight fanned out from its source in the Arctic but moved progressively southward and westward. Reports from local

observers in eastern North America concerning the direction of flight add detail to the picture. Owls entered Newfoundland at the extreme north; their point of entry into the Maritime Provinces was at Tignish, Prince County, Prince Edward Island; they appeared to move from the east southwestward in Quebec along the St. Lawrence, though obviously some moved south through the interior of that Province; a line of flight seemed apparent from James Bay southward in Ontario; the major points of entry into Michigan appeared to be Chippewa County in the north, Saginaw Bay and the Port Huron-Detroit region in the east; the invasion entered Ohio from the north, west of Lake Erie, and New York State from the St. Lawrence River region (Jefferson, St. Lawrence, and Clinton counties).

In the west, no such clear lines of flight were apparent. A single report from Baker Lake in Northwest Territories states that large numbers of Snowy Owls passed through there "early in November" (indicated by a single arrow on the accompanying map). The invasion of the northern prairies was apparently on a wide front. The Committee's data do not suggest either source or direction of the flight in British Columbia or the northwestern States.

The 1945-46 pattern of concentration-areas in the east is essentially the same as that in 1941-42 though salients will be evident if the maps of the two flights are compared. The limits of dispersal of the 1945-46 flight are considerably farther south than in 1941-42, and the flight involved the west. (Since only the normal influx was evident in the west during the fall and winter of 1941-42, that region was omitted from the Committee's first report and map.) The map for 1945-46 shows a true scattering of the flight on the northern prairies in contrast with the concentration in the east between the great forested areas and along inland shores, valleys, the Great Lakes, and the sea coast. Since Snowy Owls frequent open cultivated farmland, forest clearings, barrens, and shore areas, the concentration and scatter areas shown on the map are probably real, not a reflection of the distribution of observers.

Since the numerically larger flight of 1945-46 produced occurrences much farther from the source than any reported in 1941-42 and since the flight involved the west as well as the east, there would appear to be a correlation between the number of owls, the distance they will travel, and the geographical area over which they will spread.

Royal Ontario Museum of Zoology, Toronto

THE REARING OF A COWBIRD BY ACADIAN FLYCATCHERS [1]

BY ALFRED E. BRANDT

WHILE assisting Dr. George M. Sutton with his study of the nesting birds of the Edwin S. George Reserve (a 1,300-acre tract near Pinckney, Livingston County, southeastern Michigan), I discovered on June 22, 1946, the newly finished nest of a pair of Acadian Flycatchers (*Empidonax virescens*). I visited the nest repeatedly from June 22 to July 22, and observed the rearing of the brood, a single Cowbird (*Molothrus ater*).

Despite Bendire's (1895:304) statement that the Cowbird "imposes occasionally" on the Acadian Flycatcher; Evermann's (1889:23) statement that the Acadian Flycatcher is "one of the most frequent victims of the Cowbird" in Carroll County, Indiana; and Jacobs' (1924: 53) record of 12 parasitized Acadian Flycatcher nests in southwestern Pennsylvania, I find no published account of the history of a parasitized Acadian Flycatcher nest and no definite record of the fledging of a young Cowbird by Acadian Flycatcher parents. Friedmann (1929:209) stated that he knew "but few definite" records of parasitism of the Acadian Flycatcher by the Cowbird.

The Flycatchers' nest-territory was in the Reserve's most extensive woodland—a uniform 130-acre stretch of oak-hickory forest known as the Big Woods. My attention was first attracted to the birds while Dr. Sutton and I were watching Cerulean Warblers at their nest from about 3:30 to 4:30 p.m. on June 22. During that hour, the Flycatchers called almost constantly, their cries coming from a dry kettle hole near us with a low ridge and open leatherleaf bog ("Buck Hollow") beyond it. Stationing myself in a well concealed spot, I watched the birds with my binocular, hoping that they would lead me to their nest.

The territory was much like three other Acadian Flycatcher territories that Dr. Sutton and I had found elsewhere in the Big Woods. Tall oaks and hickories darkly shaded the heavy under-story of witch hazel (*Hamamelis virginiana*) and sassafras (*Sassafras albidum*). The ground was thickly covered with dry leaves, and where the shadows were deepest, luxuriant stands of maiden-hair fern (*Adiantum pedatum*) grew. The area in general was shared by several pairs of nesting birds—Cerulean Warblers (*Dendroica cerulea*), Red-eyed Vireos (*Vireo olivaceus*), and Eastern Wood Pewees (*Myiochanes virens*). In the distance I could hear Scarlet Tanagers, Oven-birds, and Yellow-throated Vireos singing; from the other side of the kettle, a Yellow-billed Cuckoo continually clucked. Occasionally a Ruby-throated Hummingbird buzzed through the small openings in the woods, and I saw a female

[1] I wish to thank Dr. F. N. Hamerstrom, Jr., Curator of the Edwin S. George Reserve, for reading and criticizing this manuscript.

Cowbird accompanied by several males moving through the taller trees. Mosquitoes were abundant and caused me much discomfort as I tried to maintain a motionless position on the ground. The Acadian Flycatchers continued to call as they moved among the shadows from one low tree to another. Their call was usually a *peet,* with an occasional explosive *kit-a-rup*. Suddenly one of them darted onto what appeared to be a bit of hanging debris, but which proved to be a nest.

The body of the nest was composed of dried plant stems, held together by cobwebs. It was swung across an 80-degree fork at the end of one of the longer horizontal branches of a witch hazel. An eight-inch strand of entwined cobwebs with entangled flowers of oak or hickory hung from the rim. So flimsy and so loosely woven was the structure that I could easily see the tree-tops as I looked upward through the bottom. It appeared to be completed and ready for eggs. As I left the spot, one of the Flycatchers returned to the nest.

When Dr. Sutton visited the nest at 5:25 a.m., June 25, there was one egg. One egg was in the nest when he examined it an hour later.

On June 27, Dr. Sutton found two eggs in the nest at 6:10 a.m. When I went to the kettle hole at 11:20 the same morning, a Flycatcher (presumably the female) was on the nest. When I came within 30 feet it flew to a near-by sassafras sapling, whence it called excitedly. Its mate was near by, also calling. There were then three eggs. The third had been laid in the four-hour interval.

When I approached on June 29, at 6:30 a.m., a Flycatcher was on the nest. When it left, I found one Cowbird egg and one Flycatcher egg. Searching the ground below the nest, I found the two missing Flycatcher eggs—one broken in half, the other intact. There was no indication that either had been punctured by the Cowbird's bill (see Hann, 1941: 219). Both were heavily wreathed at the larger end with reddish brown splotches and dots; that remaining in the nest, curiously enough, was almost immaculate. The two eggs in the nest offered a striking contrast —the large Cowbird egg heavily spotted, the much smaller and differently shaped Flycatcher egg virtually unmarked. Both Flycatchers were nearby. As I withdrew, one of them flew to the nest.

Dr. Sutton visited the kettle hole on July 1, finding one Cowbird egg and one Flycatcher egg in the nest.

On July 12 I found both eggs hatched. Presumably they had hatched two days or so previously, the incubation period, as reported by Harold M. Holland, being 13 days (see Bent, 1942:190). The young Flycatcher was covered above with whitish-gray down. The Cowbird, which appeared to be three times as large as its fellow, was covered with blackish-gray down. The eyes of both birds were closed. The mouth lining of the Flycatcher was straw yellow, that of the Cowbird, dull pinkish-red. The Cowbird occupied far more than half of the nest space. With head resting on the rim, and bill pointed upward, it was able to lift its head for food far higher than its companion could. The

Figure 1. Acadian Flycatcher brooding young Cowbird.

Figure 2. Acadian Flycatcher nest after the young Cowbird had fallen through. (Photographed from directly above.)

Flycatcher, crowded as it was against the nest wall, squirmed constantly, raising its head and opening its mouth from time to time. I was careful not to touch the nest or supporting branch, but the Flycatcher's behavior may have been in response to sounds I had made in approaching, or perhaps to my shadow falling over the nest. In any event, it seemed to indicate that the bird was hungry.

On the morning of July 13, the Cowbird was the sole occupant of the nest. It appeared to have doubled in size and now almost filled the nest. Though I made careful search among the leaves on the ground below the nest, I could find no trace of the young Flycatcher. I concealed myself in a blind four feet from the nest and watched the feeding and brooding of the young Cowbird for about two hours.

I noted that only one of the Flycatchers brought food to the nestling; its mate was near by but never approached the nest. The one Flycatcher, presumably the female, made trips to the nest every three or four minutes, carrying what appeared to be mosquitoes and other tiny insects in its bill. Each time after feeding the Cowbird, it stood on the edge a few seconds, uttering soft peeping noises and spreading its belly feathers, then moved forward to brood. The Cowbird invariably struggled, forcing the Flycatcher up and down in the nest until it freed its head. When its head lay on the rim of the nest, it ceased struggling (Figure 1). After brooding for one or two minutes, the Flycatcher left.

On July 19, I found a gaping ragged hole in the nest bottom (Figure 2). The Cowbird was on the ground directly below. Presumably the big heavy-footed nestling, then about nine days old, had caused the bottom of the nest to give way and had fallen to the ground. As far as I could determine, it was not injured by the fall, and when I touched it, it fluttered rather helplessly, moving about eight inches. Both Flycatchers were calling excitedly, but neither of them approached the Cowbird closer than 15 feet during the time I was at the nest.

On July 20 I could not at first find the Cowbird. After a careful search I found it almost completely hidden among the dry leaves and other litter. So well did the depression conform to the size of the bird and so closely did the leaves form around it, that it appeared to be sitting in a nest. So well concealed was it that I could not see it from a greater distance than five feet.

On the following day, July 21, the Cowbird occupied the same spot. When I touched its back with a twig, it fluttered over the ground a distance of 10 feet, finally dropping among the leaves. I caught it and placed it back in the depression, where it nestled down and remained motionless. It seemed in good health, and its more vigorous attempt to escape indicated that it was much stronger than it had been the day before. Obviously it had been fed by one or both of the Flycatchers, which had adapted themselves to feeding it on the ground. I watched the Cowbird from a short distance in the hope that I might see it fed. Though I did see one of the Flycatchers approach it within four feet,

and I could hear the Cowbird calling, I did not see any actual feeding taking place. Possibly I was too close, for at the slightest movement of the canvas which I had wrapped around me, the Flycatcher would withdraw immediately, fly to the witch hazel and call excitedly.

When I returned in mid-afternoon on July 22, the Cowbird was gone from the depression. The Flycatchers were calling from the eastern lower edge of the kettle hole about 75 yards away. I searched the area about the nest but could not find the Cowbird. Since neither of the Flycatchers returned to the nest, I walked toward them, believing that the young Cowbird might be there. The Flycatchers did not move about much, but they continued to call; I did not during the hour I was there see food in the mouth of either bird, nor did I see one of them go to the ground. I did not see the Cowbird again. The Flycatchers continued to inhabit the kettle hole. Dr. Sutton saw them there as late as August 16.

Summary

On or about June 22, 1946, a pair of Acadian Flycatchers (*Empidonax virescens*) completed their nest at the Edwin S. George Reserve, southeastern Michigan.

On June 27 the nest contained three Flycatcher eggs; on June 29, one Flycatcher egg and one Cowbird (*Molothrus ater*) egg; on July 12, a young Flycatcher and a young Cowbird; on July 13, only the young Cowbird.

The young Cowbird was fed and brooded by one of the Flycatchers on July 13.

On July 19 the Cowbird was on the ground below the nest, having apparently fallen through the bottom of the nest.

The Cowbird remained on the ground, nestled in a depression in the leaves for two and a half days. It was apparently fed by the Flycatchers, since it remained in excellent condition.

On July 22 the Cowbird had disappeared, and the Flycatchers were calling about 75 yards away from the nest.

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Forest Home, Ithaca, New York

THE COWBIRDS OF PRESTON FRITH

BY RUSSELL T. NORRIS

THE Preston Laboratory Grounds, comprising about 90 acres, and lying three miles due west of the city of Butler, Pennsylvania, are surrounded by a high fence intended to keep out dogs, grazing animals, and the like, for which reason the area is referred to briefly as "the Frith" or "Preston Frith." *

The bird population has been under observation, so far as wartime conditions permitted, for some years past, but information prior to 1943 is fragmentary and—so far as Cowbirds are concerned—negligible before 1944. Our principal interest in the bird population as a whole concerned the effects of encroaching civilization on a rural environment (Norris and Preston, MSS), and the effects of protecting the area by the fence. Although there was originally no intention to study in detail any particular species, it seemed desirable to take especial note of the Cowbird, since it stands in a category of its own by reason of its parasitic habits and may thereby affect other species in a particularly direct and determinable manner.

Nearly all the observations before sunrise I made jointly with Hal H. Harrison; most of the other field observations I made alone, though some nests with Cowbird eggs were found by Harrison, Dr. F. W. Preston, and Miss Janet Mathison. The investigation was supervised and financed by Dr. Preston of the Preston Laboratories. His suggestions and criticisms, both in the field work and in preparing the manuscript, were most helpful. Most of the observations were made in the Frith itself, only a few outside it.

About half (43 acres) of the Frith is wooded, a large part of the forest area being second-growth oak-hickory. There are smaller areas of recent cuttings, bottomland hardwoods, and aspen. There are 27 acres of old fields rapidly going back to bush, and 12 acres of grassland, all planted to rye grass. The remaining acreage is made up of fencerows, roads, parking areas, lawns, and water areas. A stream divides the Frith into two unequal portions, and a spring run has been dammed to create a small pond of about one half acre. There is a great deal of edge created by the many roads and pathways through the Frith (Figure 1).

Most of the area is part of a farm which has been very little cultivated since 1900. Since 1939 the Frith has been surrounded by a nine-foot fence which excludes dogs, domestic stock, and deer, but

* *Frith*—"Peace, freedom from molestation, protection. . . . A game preserve, deer park. . . . A wood of some kind, or wooded country collectively. . . . A piece of land grown sparsely with trees or with underwood only. . . . A space between woods; unused pasture land."—Oxford English Dictionary.

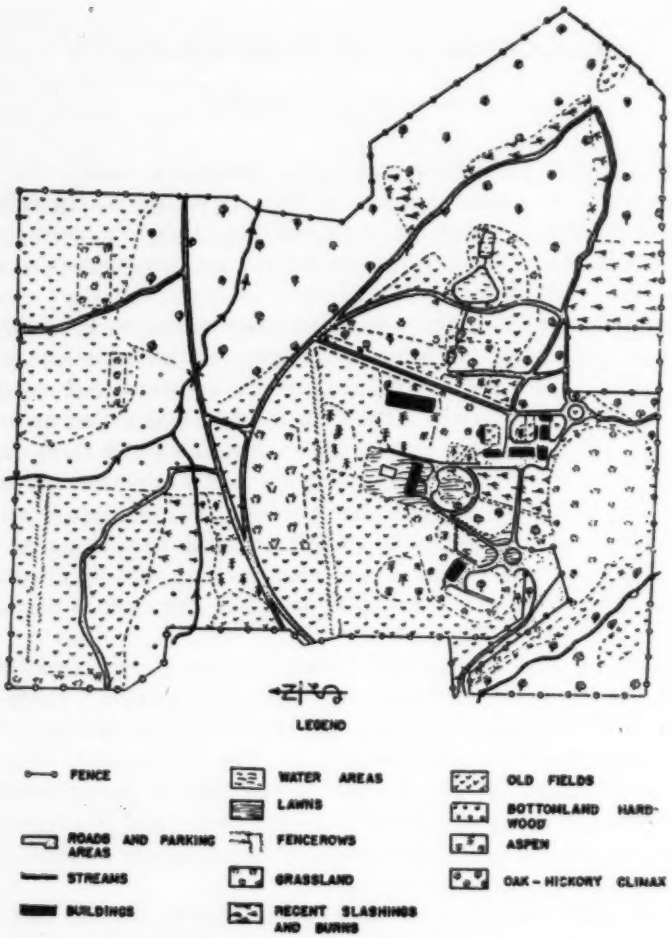

Figure 1. Cover-type map of Preston Frith. Type-boundaries are indicated with dotted lines.

does not exclude feral house cats or wild predators such as raccoons and skunks; house cats were eliminated when possible, but no effort was made to control the natural predators of bird life.

Cowbird Population

The breeding bird population of the Frith, which will be discussed more fully in another paper, was very high—probably greater than that of any similar area reported in the literature, and certainly denser than that of the surrounding countryside. The population of Cowbirds (*Molothrus ater*) also seemed definitely higher than in most of western Pennsylvania.

The Cowbirds usually arrived at the Frith during the last week of March, the males preceding the females by a few days. The month of March 1945 was unseasonably warm, and most of the migrants arrived early; male Cowbirds arrived March 15, females March 24. The following week, Cowbirds were conspicuous everywhere. The males were chasing and courting the females continually.

During the breeding season in the Frith the male Cowbirds probably outnumbered the females but not by a large margin. On June 14, 1944, at 7:00 p.m., I noticed a flock of Cowbirds feeding in a newly harrowed and sown buckwheat field about a mile from the Frith, and I counted them with the aid of field glasses. There were slightly more than 100 adult birds in the flock, of which only 4 were females. This is the only time I have seen a flock in the breeding season composed largely of one sex. At the Frith, a mile away, egg-laying was still going on, and the birds were in small groups. Since Cowbirds have not readily entered my banding traps, no exact indication of their numbers in the Frith is available. In 1944 three females were banded, two on April 28, one on May 3. (Their weights were 36.6, 39.6, and 40.6 grams respectively.) In 1945 one male (April 24) and two females (April 28) were trapped, one of which was a return. (Their weights were 45.8, 39.0, and 38.4 grams respectively.) None of these banded individuals was ever observed in the field. From the egg-laying dates and continual observation it appears that there were about 6 female Cowbirds active in the Frith in 1944 and about 10 in 1945. These estimates are conservative, and more definite data might raise them slightly.

During March, April, and the early part of May, Cowbirds were never seen in the wooded areas of the Frith. They confined their activities to the fields and open country, where they became a serious factor in the economy of the Song Sparrow (*Melospiza melodia*), Red-eyed Towhee (*Pipilo erythrophthalmus*), Cardinal (*Richmondena cardinalis*) and (to a lesser extent) of the Field Sparrow (*Spizella pusilla*). About May 15, when the Oven-bird (*Seiurus aurocapillus*), Red-eyed Vireo (*Vireo olivaceus*), Veery (*Hylocichla fuscescens*), Scarlet Tanager (*Piranga olivacea*), and Wood Thrush (*Hylocichla mustelina*) began to build their nests, the Cowbirds seemed to move into the wooded areas. They continued to parasitize some nests in the fields, but most of the late eggs, from May 15 to the end of the laying season, were deposited in nests of woodland birds. In addition to the birds just mentioned, the following were also parasitized in the Frith: Brown Thrasher (*Toxostoma rufum*), Catbird (*Dumetella carolinensis*), Yellow-throat (*Geothlypis trichas*), Chestnut-sided Warbler (*Dendroica pensylvanica*), Indigo Bunting (*Passerina cyanea*), and Chipping Sparrow (*Spizella passerina*).

Cowbirds were seen frequently from the time of their vernal appearance until June 15. During the latter half of June their number

gradually dwindled, but they were observed in the Frith for another month; in fact, egg-laying continued, though at a reduced rate, until almost mid-July. After July 10, Cowbirds were not seen in the Frith until the last half of September or early October; nor did they become common even then. On October 6, 1944, a lone female was observed in the Frith, and on September 24, 1945, I noticed a small flock of Cowbirds near the Frith. There were about a dozen birds, roughly two-thirds males. The males seemed to be chasing the females much as they do shortly after they arrive in spring. They would fly from one tree-top to another, the males giving the flight whistle and the females rattling as they do while courting. I have not observed this in the fall on any other occasion.

TABLE 1

COWBIRD EGG-LAYING AND HATCHING DATES, PRESTON FRITH

	Laying		Hatching			Laying		Hatching	
	1944	1945	1944	1945		1944	1945	1944	1945
April 10		1			May 26		3		
11		1			27		2		
16		1			28		1		
17		1			29		1		
18		1			30		2		
19		1			31		2		
20		1			June 1		3	1	1
21		3			2	1	4		1
22		1			3		2		1
24				1	4		1		4
27	1	1			6			1	
May 1		2		1	7			1	1
2		1		1	8		2		3
4	1			1	9	1	2	1	2
5	1				10		3		1
7	2	1			11		2		
8	1				12		1		
9	2	1			14		1		
10		1			17			1	1
11	1				18		1		
12		1			21				1
13	1	1	1		23				1
14		2			24		1		
15				3	25	1	1		
17	1				26		2		1
18	1	1			27				1
19	1	2			28		1		
20	1	2	1		29		1		
21		1			30		2		
22	2	2	2		July 1		1		
23	1	2			11		1	1	1
24		3		2	12		1		
25	1	2	2	1					

Totals: Eggs laid in 1944, 21*; in 1945, 81. Eggs hatched in 1944, 12; in 1945, 30.

* Six 1944 egg-laying dates unknown.

Egg-laying Habits of the Cowbird

The laying season of the Cowbird in the Frith extended from the middle of April to the middle of July, about three months. Table 1 lists the egg-laying dates, and Figure 2 shows graphically their distribution. The crest of the laying season comes late in May.

The exceptionally long laying season suggests that Cowbird eggs are laid in clutches. Friedmann (1929:182) had some evidence that clutches consist of four or five eggs laid on successive days, but Rand's observation (Friedmann, 1929:184) of the captive female that laid 13 eggs in 14 successive days does not agree with this. Nice (1937:155, 163) believed that the Cowbirds in her study area in Columbus, Ohio, laid three or four "sets" of eggs with intervals of 6 to perhaps 12 days between them. She also made a guess that Cowbirds and Song Sparrows laid about the same number of eggs each. In a recent letter she expressed a belief that Cowbirds probably lay 16 eggs in a season.

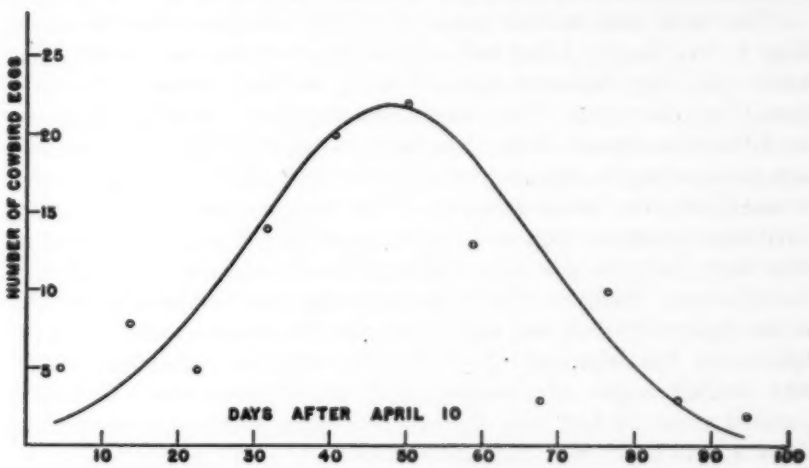

Figure 2. The Cowbird's laying season, Preston Frith, 1944-1945.

Hann (1937:207) believed from his studies of Cowbird parasitism at Oven-bird nests in Michigan that each female laid about 8 eggs, but he reported Hicks' opinion that the female Cowbird lays as many as 16 eggs in a season. Very rough estimates based on our observations in the Frith during 1944 and 1945 led me to believe that the Cowbird lays at least 14 eggs in a season.

Hann (1937:201) stated that the female Cowbird finds Ovenbirds' nests by watching the females build. On several occasions I have seen female Cowbirds perched motionless and watching nest-building intently, but I did not later find Cowbird eggs in the nests which I thought were being observed. (It is possible that the bird in each instance was watching another nest near by.) Apparently Cowbirds

spend considerable time inspecting and visiting nests for reasons difficult or impossible to determine. While watching a Robin (*Turdus migratorius*) building on April 13, 1945, I saw a female Cowbird alight in the nest tree, hop down to within six inches of the nest and peer into it. Then the female Robin returned, and the Cowbird flew away. The Robin did not seem perturbed at the presence of the parasite. This occurred at 6:00 a.m.; about a half hour later, three female Cowbirds alighted in the nest tree while the female Robin was moulding the nest. The Robin paid no attention to them. At 8:10 a.m., a female Cowbird again alighted in the nest tree. The female Robin was away from the nest gathering material. The Cowbird deliberately walked to the nest, hopped in, and settled down. She turned her head in every direction, and then the female Robin arrived. The Cowbird left hurriedly, but the Robin did not chase her or seem disturbed at her presence. The nest was well formed at this time, but the inside was not lined and the mud was very wet.

This same nest was the scene of another Cowbird observation on May 2. On May 1, I had noticed that three of the four Robin eggs, which had been incubated about a week, had tiny holes in the shell resembling pin pricks. They would not have been noticed except for a whitish area around them. The holes occurred in irregular numbers and positions on the eggs and hence did not look like claw marks. Under a hand lens, the holes appeared to be crescent-shaped; they could have been caused by taps of a bird's mandibles. Within a few days of this date, holes of this type appeared in the eggs of three near-by Robin's nests. Early on May 2 the three eggs that had been punctured in the first-mentioned nest were gone, but the Robin continued to incubate the remaining egg. At 9:00 a.m., while the Robin was off the nest feeding, a pair of Cowbirds flew into the nest tree. The male perched about 20 feet from the nest while the female walked directly down a limb to the nest and looked inside. At that moment both birds were accidentally frightened off by a workman. On May 3 the last egg was gone from the nest. House Wrens (*Troglodytes aëdon*) had not yet arrived in the Frith, so the tiny holes cannot be blamed on this species. When Blue Jays (*Cyanocitta cristata*) destroy Robin's nests, they leave large holes in the eggs or carry them away completely. Two female Cowbirds that were held captive in the Frith were each given on the second day a Robin's nest containing two eggs. On the third day all four eggs had been punctured, but the holes were large (the eggs were left in the nests and the contents not eaten). The interest that Cowbirds showed in the Robin's nest mentioned above suggests that they may have been responsible for the tiny holes in the Robins' eggs in that vicinity, but there seems no good reason for this type of destruction. The eggs were not eaten, and the nests were not parasitized (so far as we know) after the damage was done.

On June 14, 1945, I watched the nest of a Cerulean Warbler (*Dendroica cerulea*) for more than 10 minutes, and the female, who had been incubating for about 10 days and rarely left the nest for more than a few minutes, did not return. The male was singing near the nest, which was 45 feet above the ground near the end of a limb. At 9:55 a.m., a female Cowbird flew swiftly down the valley and went directly to the nest tree. She immediately walked up the limb to the nest as if she had been there before. She hopped onto the rim of the nest, stepped in, and settled down. In a few seconds she flew away sputtering. Neither male nor female Warbler seemed perturbed at this, and I decided to investigate. Upon climbing the tree, I found that only one egg of the Warblers remained, and this had been punctured, apparently by a bird's mandibles.

During 1944 and 1945 in the Frith, 45 parasitized nests contained but a single Cowbird egg each, 21 contained two Cowbird eggs, and 7 contained three (Table 2). Hann (1941:220) believed that the Cowbird laid but one egg in a nest unless nests were scarce. However, certainly nests were not scarce in the Frith, and 38 per cent of the parasitized nests contained more than one Cowbird egg (for an extreme example, see Figure 3). When nests were found that contained two or three Cowbird eggs, an effort was made to determine whether they were the product of one or several females. If we may judge from egg type, two nests that each contained three Cowbird eggs were each parasitized by three females; one nest that contained three Cowbird eggs was parasitized by two; three nests that each contained two Cowbird eggs were each parasitized by two females.

The measurements of 17 Cowbird eggs in the Frith ranged from 24.5 x 17.3 mm. and 23.2 x 18.3 mm. to 21.1 x 16.0 mm., averaging 22.5 x 17.1 mm. Weights of the 17 eggs ranged from 3.50 to 2.00 grams, averaging 2.95 grams.

The Cowbird at the Nest

In attempting to photograph the Cowbird at the nest, we found it necessary to acquaint ourselves with the routine of Cowbird egg-laying. Hann (1941:220) found that Cowbirds usually lay their eggs at dawn; that they usually lay during the egg-laying period of the host; and that parasitized nests regularly have one or more eggs removed by the Cowbird; but we found that the behavior of the female Cowbird was different at the nests of different species.

Our five observations of the Cowbird at the nest for the purpose of laying were all at dawn, or at any rate before sunrise. They are given in Table 3 with the times of sunrise, weather conditions, and the dates. The times given in each case are in Eastern Standard Time, and they refer to the exact moment the Cowbird was first seen about the nest.

From the figures in Table 3, the differences in time of arrival at the nests in open fields and at those in the woodland appear to be

TABLE 2

THE COWBIRD IN RELATION TO ITS HOSTS, PRESTON FRITH, 1944-45

Species	Total nests	Parasitized nests	Nests with Cowbird eggs: 1	2	3	Cowbird eggs laid	Cowbird eggs hatched	Cowbird young fledged
Catbird	47	1(2.1%)	1	—	—	1	0	—
Brown Thrasher	14	1(7.1%)	—	1	—	2	0	—
Wood Thrush	11	2(18.2%)	2	—	—	2	1(50.0%)	1(50.0%)
Veery	11	7(63.6%)	6	1	—	8	8(100.0%)	4(50.0%)
Red-eyed Vireo	14	12(85.8%)	7	4	1	18	2(11.1%)	0
Chestnut-sided Warbler	2	1(50.0%)	—	—	1	3	0	—
Oven-bird	7	6(85.7%)	2	2	2	12	7(58.3%)	3(25.0%)
Yellow-throat	2	2(100.0%)	1	—	1	4	0	—
Scarlet Tanager	4	4(100.0%)	3	1	—	5	2(40.0%)	2(40.0%)
Cardinal	8	3(37.5%)	2	1	—	4	2(50.0%)	2(50.0%)
Red-eyed Towhee	24	13(54.2%)	6	5	2	22	15(68.2%)	12(54.5%)
Chipping Sparrow	9	1(11.1%)	1	—	—	1	0	—
Field Sparrow	57	9(15.8%)	5	4	—	13	2(15.4%)	1(7.7%)
Song Sparrow	27	11(40.7%)	9	2	—	13	7(53.8%)	4(30.8%)
Totals	237	73(30.8%)*	45	21	7	108	46(42.6%)	29(26.8%)

* Excluding the Brown Thrasher, Catbird, and Chipping Sparrow, this figure is 41.9%.

significant. On the two clear mornings in the fields the Cowbird came to the nest much earlier than on the three mornings in the woods, so that the time of laying seems to be correlated with light intensity. The observation on June 1 lends strength to this theory. It was a cloudy morning and very dark in the deep woods; we had nearly given up our vigil when the Cowbird appeared. It began to rain a few minutes later. The observations on June 9 and 11 were made in the woods but near a clearing.

The laying of the Cowbird at dawn seems strange in view of the fact that this species is one of the last birds to be heard in the morning. Nice (letter) has expressed her belief that the Cowbird is a late riser. At the Song Sparrow nest in 1944 (Norris, 1944), we heard a female Cowbird call just before she alighted on the camera at the nest, but at other nests no Cowbird note was heard until after the egg-laying. In April 1945, the average time of Cowbird notes was about six minutes before sunrise. It seems probable that Cowbirds are quiet until the eggs are laid,—when they become noisy, as they do each morning, the eggs are already deposited.

TABLE 3

TIMES OF COWBIRD LAYING IN RELATION TO SUNRISE

Date	Cowbird's arrival (a.m.)	Sunrise	Minutes before sunrise	Weather	Host	Location of nest
1944						
May 29	4:30	4:52	22	Clear	Song Sparrow	Field
1945						
May 30	4:30	4:53	23	Clear	Indigo Bunting	Field
June 1	4:50	4:53	3	Heavily overcast	Oven-bird	Woods
June 9	4:42	4:51	9	Clear	Red-eyed Vireo	Woods
June 11	4:36	4:50	14	Overcast	Red-eyed Vireo	Woods

In Hann's (1937:204) study, the loss of 34 Oven-bird eggs (85 per cent of the number of Cowbird eggs laid) was attributed to the female Cowbird; 10 eggs disappeared on the day before the Cowbird's egg was laid, 10 on the same day, and 3 on the following day. Nice (1937:158) found that eggs of the host disappeared 37.2 per cent of the times Cowbird eggs were laid in Song Sparrow nests.

My data on egg removal are quite fragmentary, but in 11 instances I am quite sure the loss of eggs from nests was caused by Cowbirds. Once a single egg was removed (from a Field Sparrow's nest), seven times an egg was removed when two were in the nest, once when the nest contained three eggs, once when the nest contained three eggs of

the host and one of the Cowbird; once two eggs were removed from a nest containing three eggs that had been incubated for five days. Burroughs (1887:24) and Hann (1941:212) noted that the removal of eggs was confined to nests with two or more eggs.

I have notes on the exact conditions under which 32 eggs were laid. In only seven instances did the Cowbird lay the day after she had removed an egg from a nest of two eggs—which was the pattern we had been depending on. It soon became evident that the Cowbird usually laid in Red-eyed Vireo's nests *before* the Vireo began to lay. This may be due to the coordination of the Cowbird's egg-laying with nest building: Hann (1941: 220) believed that the sight of a bird building its nest served as a stimulus to the Cowbird and that an egg would be laid four or five days later. The Red-eyed Vireo takes several days to complete its nest and then sometimes waits several more before laying its first egg. When a female Cowbird is stimulated by the sight of the Vireo's building, her egg is ready to be laid before the Vireo has started to lay. In 6 of the 10 Vireo nests in 1945 the Cowbird laid prematurely; in 2 she laid after removing an egg the day before, and in one nest she laid when one Vireo egg was there and none had been removed. In the remaining nest, the Cowbird laid five days after incubation started. In one of the 6 nests where the Cowbird laid prematurely, the egg appeared eight days after the nest was started. The Vireo then deserted. This lack of synchronization seems to occur occasionally in nests of other species; I have found several nests containing one Cowbird egg and none of the host species.

After our success in photographing the female Cowbird laying her egg in the nest of a Song Sparrow (Norris, 1944), Harrison and I hoped to photograph the Cowbird on many nests and anxiously awaited the laying season in 1945. Early in the season our efforts were without result. To give one example: An Indigo Bunting (*Passerina cyanea*) nest had been under observation, and when the nest was completed on May 27 we decided to check it several times daily for signs of Cowbird activity. One Bunting egg was laid on May 28 and a second on May 29, before 8:00 a.m. By 11:00 a.m. on that day, only one egg remained. The nest was intact, and no sign of predation could be seen. We decided to attempt a photograph the next morning. We arrived at the nest at 3:45 a.m. and prepared the equipment. Our truck was used as a blind about 25 feet from the nest, and we were ready to go inside at 4:00 a.m. We watched the nest intently but saw nothing until 4:30 a.m., just 23 minutes before sunrise. We then heard a whir of wings and saw a female Cowbird speeding away from the nest. We then found a warm Cowbird egg beside the single egg of the Bunting. The nest was surrounded by tall grass, with only the front in clear view. The Cowbird had apparently entered the nest from the dense cover behind and deposited her egg without making a sound.

On May 26, I had found an Oven-bird's nest nearly complete in the Frith. I watched it closely because we knew that this was a favored host of the Cowbird. Hann (1941) had already twice photographed a Cowbird at an Oven-bird nest in black and white, but we wanted to try it in color. On May 29, the first Oven-bird egg was laid, and the second was there on May 30. I was unable to check the nest until late in the day on May 31, and to my surprise I found it still contained only two eggs. Since the Oven-bird usually lays an egg a day until her clutch is complete, we assumed that the Oven-bird had laid her third egg and that the Cowbird had removed one sometime before I checked the nest. This was only a guess, but we decided to attempt the picture.

We were in the blind ready for the Cowbird at 4:05 a.m. on June 1. It was a heavily overcast morning, and occasionally a drop of rain would hit the blind. At 4:50 a.m., just three minutes before sunrise, we heard a rustle in the leaves beside the blind. Finally, at 4:58 a.m., a female Cowbird appeared at the edge of the nest and entered. Harrison pressed the button on the batteries, and the color picture was taken (shown in black and white, Figure 4). The Cowbird immediately flew from the nest and did not lay her egg. We waited until 5:15 a.m., when the Oven-bird arrived to lay, but the Cowbird did not return.

We watched two Red-eyed Vireo nests, waiting for the Vireo to begin to lay, but in both nests the Cowbird laid first. Then on June 5 Harrison found a Red-eyed Vireo building about eight feet up in a maple tree. The nest progressed rapidly, and on June 6 it was complete except for the lining. We decided to set up our equipment at this nest every morning; since this Vireo is one of the favored hosts, we felt that sooner or later a Cowbird would attempt to lay her egg in the nest.

The previous photographs had been taken at ground nests, and Harrison had merely placed his camera on a tripod in front of the nest. This nest was eight feet from the ground on the end of a maple limb. Harrison carried with him a series of ladders of several heights, and these were fitted for an extension on the top step with a tripod screw on the end which can be locked at any desired height. On the evening of June 6 we went to the nest just before dusk to arrange the equipment. The camera was temporarily placed on top of the ladder to focus for distance, and then it occurred to us that if a Cowbird should walk out on this frail limb, the nest would dip completely out of sight. By placing a 40-gram weight in the nest and watching it dip about a foot, we realized that it would be necessary to secure the branch both vertically and horizontally. I cut a forked stick about eight feet long, pushed it into the ground and placed the fork against the branch that supported the nest. Then with fine copper wire I lashed the two together, making it impossible for the Cowbird to move

the nest vertically. This forked stick was held in position and horizontal movement prevented by taut wires strung from it to trunks of near-by trees. After placing our blind a few feet away, we were ready for the Cowbird. We left the nest wondering if all our paraphernalia would frighten the Cowbird away if she should come to deposit an egg.

The next morning (June 7) we were at the nest long before daybreak, but saw nothing of the Cowbird or the Vireo. The nest was lined during the day, however, and the fact that our apparatus, which we did not remove, did not keep the Vireo from completing her nest encouraged us greatly. We were at the nest on June 8, but the Cowbird did not appear. On the morning of June 9 we again set up the camera, and at 4:15 a.m. were in the blind watching the nest intently. It was dark enough to make vision quite difficult, especially from our tiny peepholes in the blind. At 4:42 a.m., 9 minutes before sunrise, a female Cowbird alighted on the top step of the ladder about two feet from the nest. For a few seconds she seemed poised to fly away, but at 4:43 a.m. she flew to the limb supporting the nest and alighted about 5 inches from the nest rim. One minute later she hopped to the rim, looked in, then settled on the nest. She looked away from the camera, then turned in profile. Harrison pressed the button, and our long-awaited picture was taken in natural color. The Cowbird remained motionless after the flash went off but did not lay her egg. At 4:45 a. m. Harrison left the blind, and she flew from the nest. From the photograph it is easy to see that the Cowbird made no attempt to get into the tiny nest; she merely stretched out along the limb and across the top of the nest.

The Vireo laid her first egg before 9:30 a.m. June 9, and her second was in the nest by 9:30 a.m. June 10. When I checked the nest at 1:00 p.m. that day, only one egg remained. On June 11 we were in the blind at 4:15 a.m., and the sky was heavily overcast. At 4:36 a.m., 14 minutes before sunrise, a female Cowbird flew rapidly down the valley toward the blind. She headed directly for the nest tree, but when a short distance away, she apparently noticed the camera and other equipment. She veered from her course and alighted in the nest tree about three feet from the nest. In a series of hops she began to approach the nest, and 57 seconds later, as she hesitated on the limb near the nest, Harrison pressed the button (Figure 5). She immediately flew away, and Harrison went out to change the film from color to black-and-white. In a short while he was back in the blind. At 4:41 a.m. the Cowbird appeared in the nest tree again, this time six feet above and five feet at the side of the nest. She very cautiously approached the nest, one hop at a time. Two minutes and 28 seconds later she finally settled herself on the nest. Harrison again pressed the button (Figure 6), and she flew from the nest after the flash went off. She did not lay her egg and did not return.

Figure 3. Chestnut-sided Warbler nest with three eggs of the host and three of the Cowbird, June 21, 1945. Photo by Hal H. Harrison.

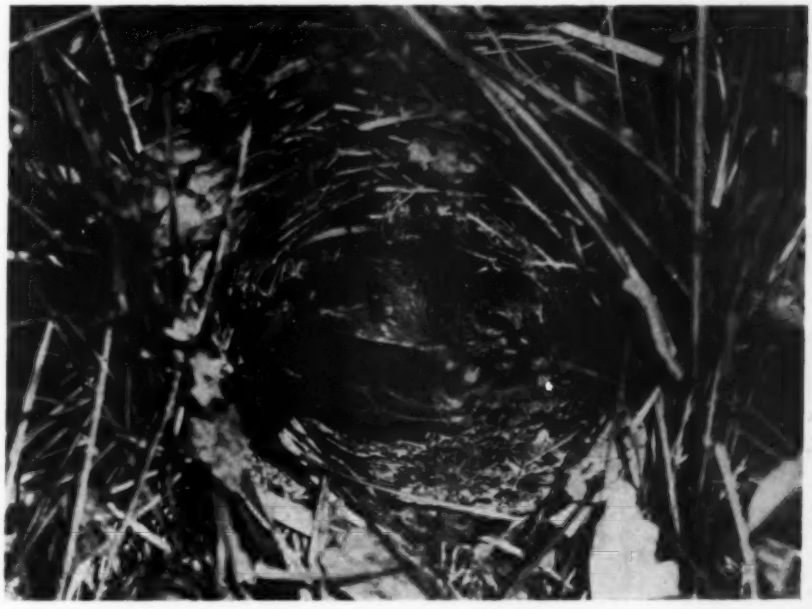

Figure 4. Cowbird on Oven-bird's nest, 4:58 a.m., June 1, 1945. Photo by Hal H. Harrison.

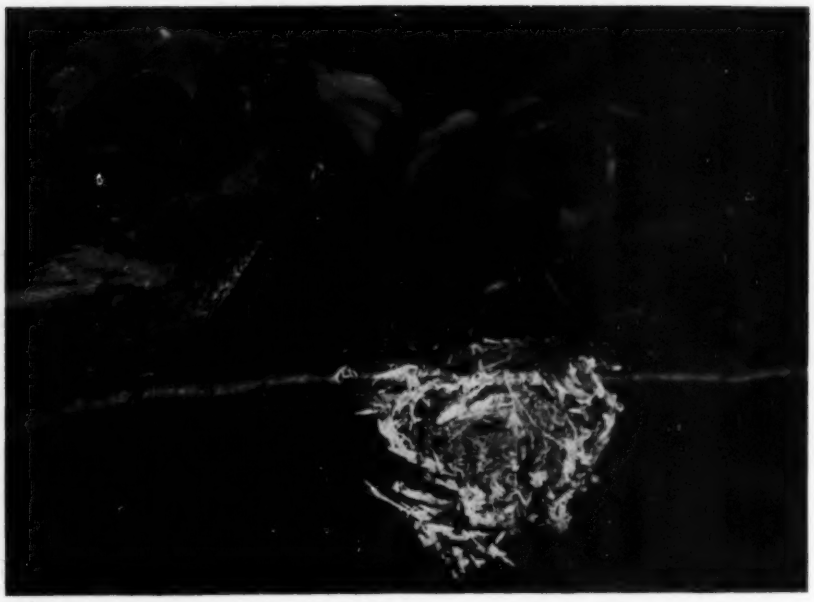

Figure 5. Cowbird approaching Red-eyed Vireo's nest, 4:37 a.m., June 11, 1945. Photo by Hal H. Harrison.

Figure 6. Cowbird on Red-eyed Vireo's nest, 4:43 a.m., June 11, 1945. Photo by Hal H. Harrison.

The Young Cowbird

The hatching dates of young Cowbirds for 1944 and 1945 in the Frith are given in Table 1. Friedmann (1929:187) gave the incubation period as 10 days, and it has long been a common belief that the young Cowbird always hatched two or three days before the host young. Nice (1937:153) found that with the Song Sparrow as host the Cowbird egg never hatched two or three days early, and sometimes hatched after the host young; normally it hatched in 11 or 12 days. Hann (1937:204) found the incubation period of the Cowbird averaged 11.6 days. I have recorded the incubation period accurately for only 10 eggs, but none of these hatched in 10 days. Five hatched in 11 days, one in 11.5 days, one in 12 days, two in 12.5 days, and one in 13 days. This gives an average of 11.6 days, exactly Hann's figure. I have recorded the hatching of 19 Cowbird eggs in relation to the hatching of the host's eggs. One Cowbird hatched four days before the host; 4 hatched one day before; 10 hatched the same day as the host; 3 hatched one day later than the host; and one hatched five days later than the host. The Cowbird egg that hatched four days early

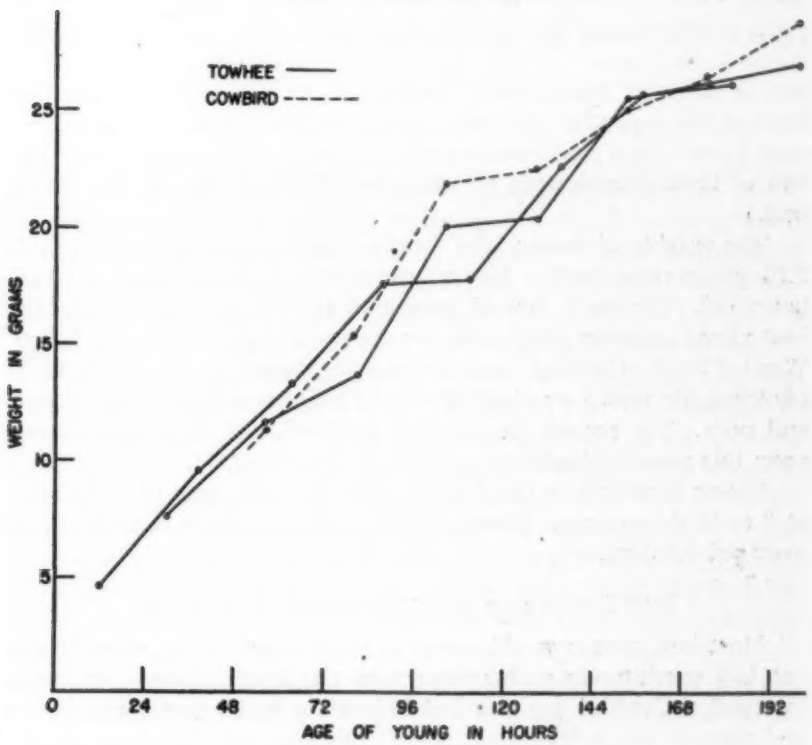

Figure 7. Daily growth rate of young Cowbird and two young of Towhee host.

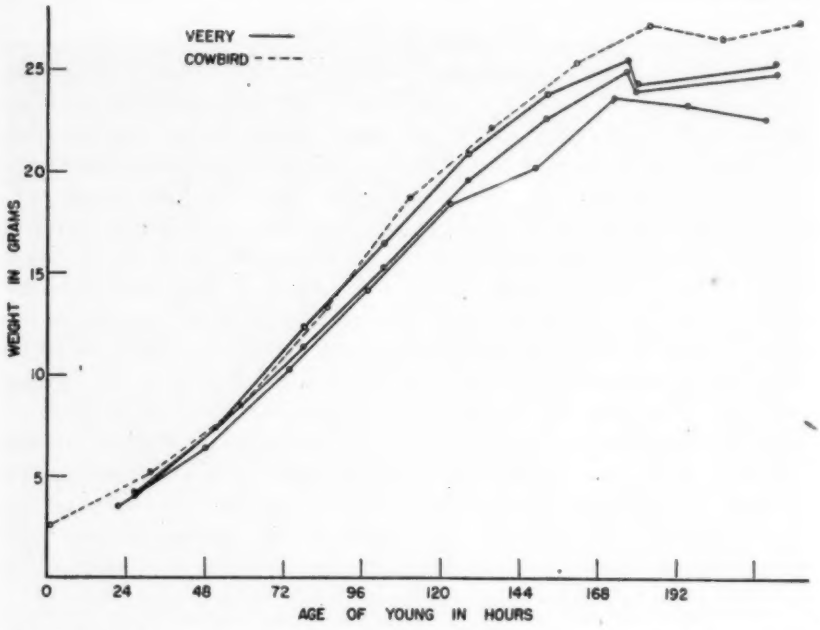

Figure 8. Daily growth rate of young Cowbird and three young of Veery host.

was in an Alder Flycatcher's (*Empidonax traillii*) nest. The egg that hatched five days after the host's egg hatched was in the nest of a Red-eyed Vireo. (Four days after incubation started on the three Vireo eggs, two of them disappeared; the next day the Cowbird egg was in the nest.)

The weights of three young Cowbirds at hatching were 2.33, 1.77, 2.70 grams respectively. Another weighed 2.60 grams when it was 6 hours old. The daily rate of growth of the young Cowbird and the host young is shown graphically for the nests of the Oven-bird, Veery, Wood Thrush, Cardinal, and Towhee in Figures 7 to 11. A daily photographic record was kept of the Cowbird and host young at several nests. The records for the Wood Thrush and Oven-bird accompany this paper (Figures 12 and 13; Tables 4 and 5).

Young Cowbirds in the Frith usually left the nests of their hosts at 8 to 10 days of age. Eleven records of the exact age of nest-leaving averaged 8.7 days.

The Success of the Cowbird in the Frith

Most host species would accept a single Cowbird egg when it was not laid prematurely with reference to the host's clutch. But nests in which a Cowbird egg was laid before the host's clutch was begun and nests in which more than one Cowbird egg was laid were usually deserted.

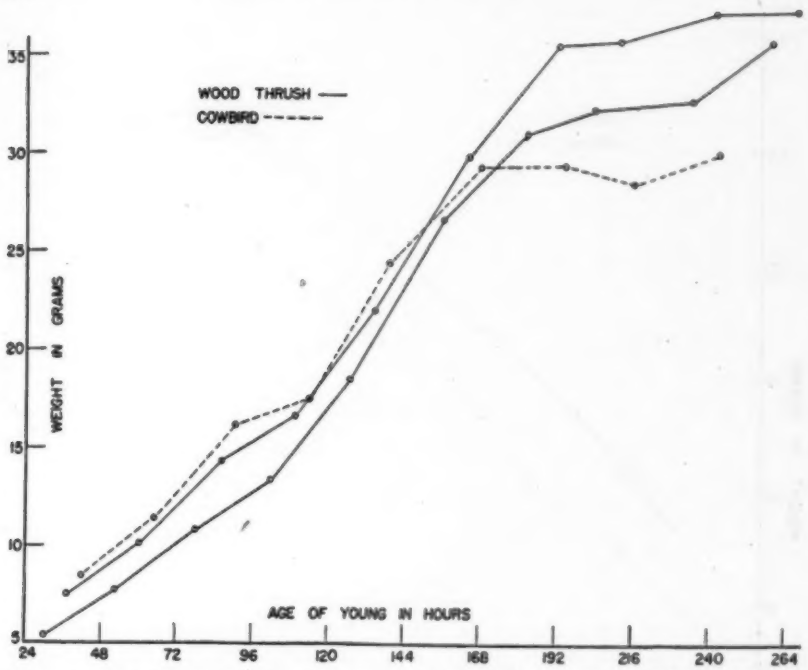

Figure 9. Daily growth rate of young Cowbird and two young of Wood Thrush host.

Of the 45 nests in which one Cowbird egg was laid, 8 were deserted apparently because the Cowbird laid prematurely; 1 was deserted even though the Cowbird's laying synchronized with the host's; 17 were destroyed; 19 produced fledglings. Of the 21 nests in which two Cowbird eggs were found, 9 were deserted; 6 were destroyed; 6 produced fledglings. Of the 8 nests in which three Cowbird eggs were deposited, 4 were deserted and 4 were destroyed; one (not included in the table) was a Chestnut-sided Warbler's (*Dendroica pensylvanica*), containing three eggs of the host as well as the three Cowbird eggs (Figure 3). Because we were anxious to obtain a series of weights of the young Warblers and a Cowbird, we removed two of the Cowbird eggs. But, as we later discovered, incubation had started a week before, and the embryos in the three Warbler eggs were dead. The one young Cowbird hatched, however, and left the nest weighing 29 grams (as compared with the weight of the adult male Warbler—9 grams). (This is the only instance in which we deliberately interfered with the natural outcome of a nest.) One Red-eyed Vireo's nest contained three Cowbird eggs and none of its own. The Cowbird eggs completely filled the nest, but the Vireo incubated them until the nest was destroyed (by unknown agency). In 1945, we found two Oven-bird nests in which three Cowbird eggs had been deposited. In one, there were three host eggs as well; it also was destroyed by unknown agency. The

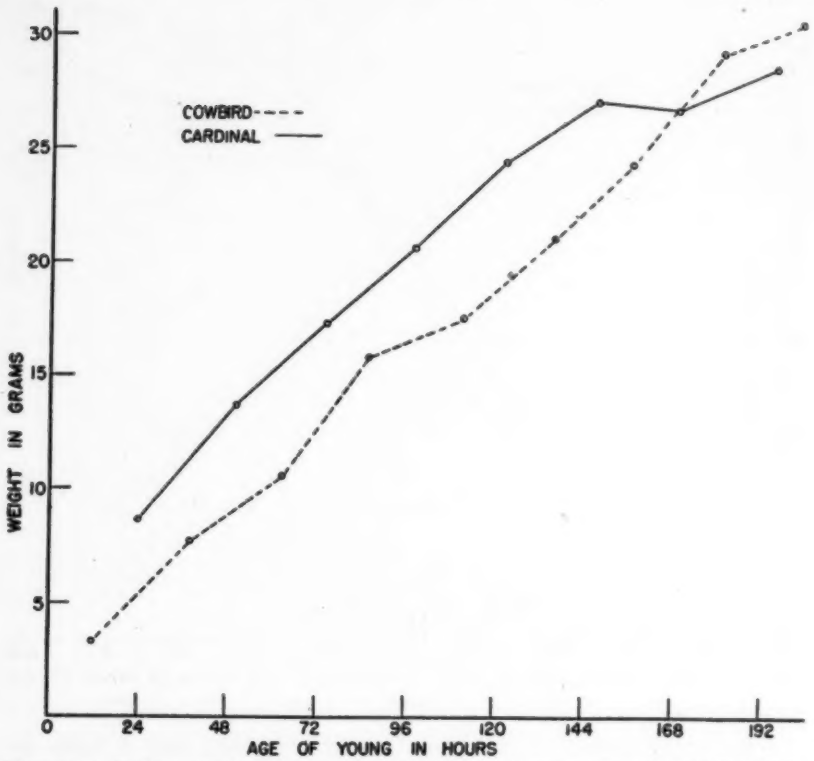

Figure 10. Daily growth rate of young Cowbird and one young of Cardinal host.

other contained three Cowbird young, two Oven-bird young, and two Oven-bird eggs (Figure 14). The birds were between one and two days old. One Oven-bird was able to maintain normal growth, but the other lost weight steadily and died two days later.

In the Alder Flycatcher nest mentioned above, in which the Cowbird hatched four days before the host young, one host young died when one day old. The remaining host young then weighed 1.59 grams, as compared with the 14.6 grams of the five-day-old Cowbird. Figure 15 shows the young Cowbird with the young Red-eyed Vireo in the nest mentioned above in which the Cowbird hatched five days after the host young. When the young Cowbird was 6 hours old, it weighed 2.60 grams, as compared with the Vireo's weight of 11.8 grams. The Vireo was 130 hours old at this time. (This nest was later destroyed.)

During 1944 and 1945, in the 237 observed nests, the hosts laid 668 eggs, of which 383 (57.3 per cent) hatched. Only 46 (42.6 per cent) of the 108 Cowbird eggs hatched. Nice (1937:163) had a much higher hatching percentage for Cowbirds (63.7 per cent, as compared with 60.7 per cent hatching in her Song Sparrow population). In the Frith, 29 (26.8 per cent) of the Cowbird eggs produced fledglings, as compared with 252 (37.7 per cent) of the eggs of the host population.

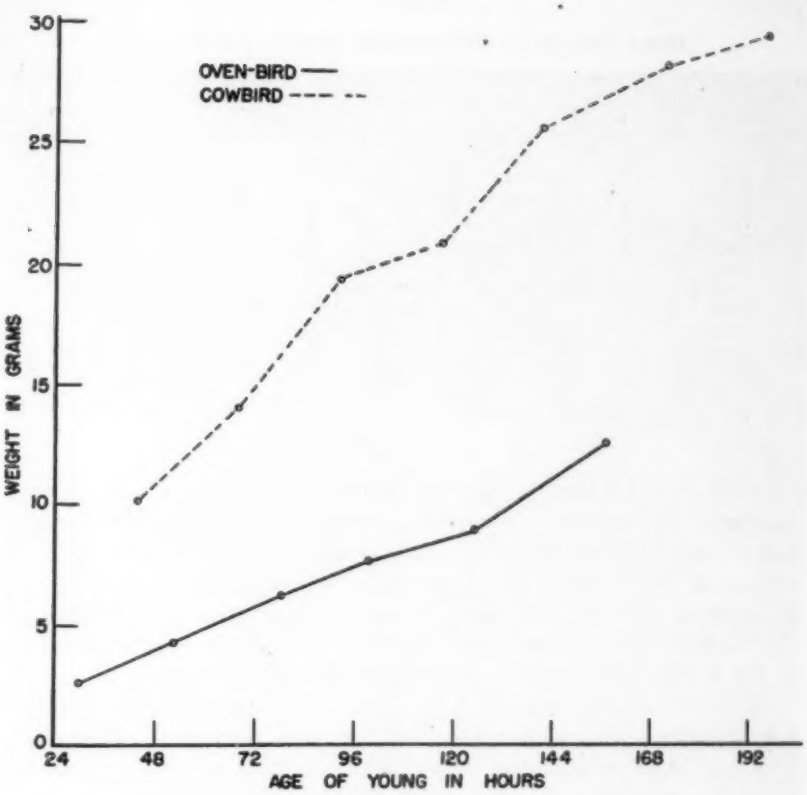

Figure 11. Daily growth rate of young Cowbird and one young of Oven-bird host.

TABLE 4

DAILY GROWTH OF YOUNG OVEN-BIRD AND COWBIRD

Date (1945)	Age and weight	
	Oven-bird	Cowbird
June 3	30 hrs (2.67 grams)	44 hrs (10.01 grams)
June 4	53 hrs (4.10 grams)	67 hrs (13.99 grams)
June 5	78 hrs (6.07 grams)	92 hrs (19.37 grams)
June 6	101 hrs (7.70 grams)	115 hrs (21.98 grams)
June 7	125 hrs (8.98 grams)	139 hrs (25.77 grams)
June 8	156 hrs (12.83 grams)	170 hrs (28.14 grams)
June 9	[Gone]	195 hrs (29.31 grams)

TABLE 5

DAILY GROWTH OF YOUNG WOOD THRUSH AND COWBIRD

Date (1945)	Age and weight	
	Wood Thrush	Cowbird
June 3	38 hrs (7.30 grams)	42 hrs (8.44 grams)
June 4	60 hrs (10.00 grams)	64 hrs (11.39 grams)
June 5	86 hrs (14.09 grams)	90 hrs (16.08 grams)
June 6	109 hrs (16.53 grams)	113 hrs (17.39 grams)
June 7	134 hrs (22.00 grams)	138 hrs (24.27 grams)
June 8	163 hrs (29.91 grams)	167 hrs (29.12 grams)
June 9	190 hrs (35.59 grams)	194 hrs (29.38 grams)
June 10	210 hrs (35.73 grams)	214 hrs (28.54 grams)
June 11	240 hrs (37.40 grams)	244 hrs (30.00 grams)
June 12	265 hrs (37.79 grams)	[Gone]

Since many Cowbird eggs are never incubated at all or are laid too long after the host's incubation period has begun, the low percentage of eggs that hatch and produce fledglings, as compared with the figures for the hosts, is not surprising. But when Cowbirds were once successfully hatched, the rates of success were more comparable. Of the Cowbird eggs hatched in the Frith, 63 per cent produced fledglings; of the hosts' eggs hatched, 64 per cent produced fledglings.

I have complete records on 21 nests that fledged at least one Cowbird young. No more than two Cowbirds were fledged in a single nest, and this occurred only five times. Twice in Towhee nests, two young Cowbirds were fledged and none of the host's young. In one instance, a young Cowbird was the sole fledgling of a pair of Song Sparrows and once of an Alder Flycatcher. In every other case, at least one host young survived. In Table 6, I have shown the comparative success of parasitized and non-parasitized nests that raised at least one host young in the Frith in 1944 and 1945. Nice (1937:160) found that each Cowbird seemed to be raised at the expense of one Song Sparrow; non-parasitized (successful) nests fledged an average of 3.4 young per nest, while parasitized (successful) nests fledged an average of 2.4 young per nest. My figures for the Frith, while less extensive, show a similar situation in relation to a group of host species. In the 35 non-parasitized (successful) nests, there were 2.94 fledglings per nest; the 19 parasitized (successful) nests fledged 2.05 host young per nest.

SUMMARY

In 1944 and 1945 Cowbird parasitism was studied in "Preston Frith," a 90-acre protected area near Butler, Pennsylvania.

By estimate, 6 female Cowbirds were active in the Frith in 1944, 10 in 1945.

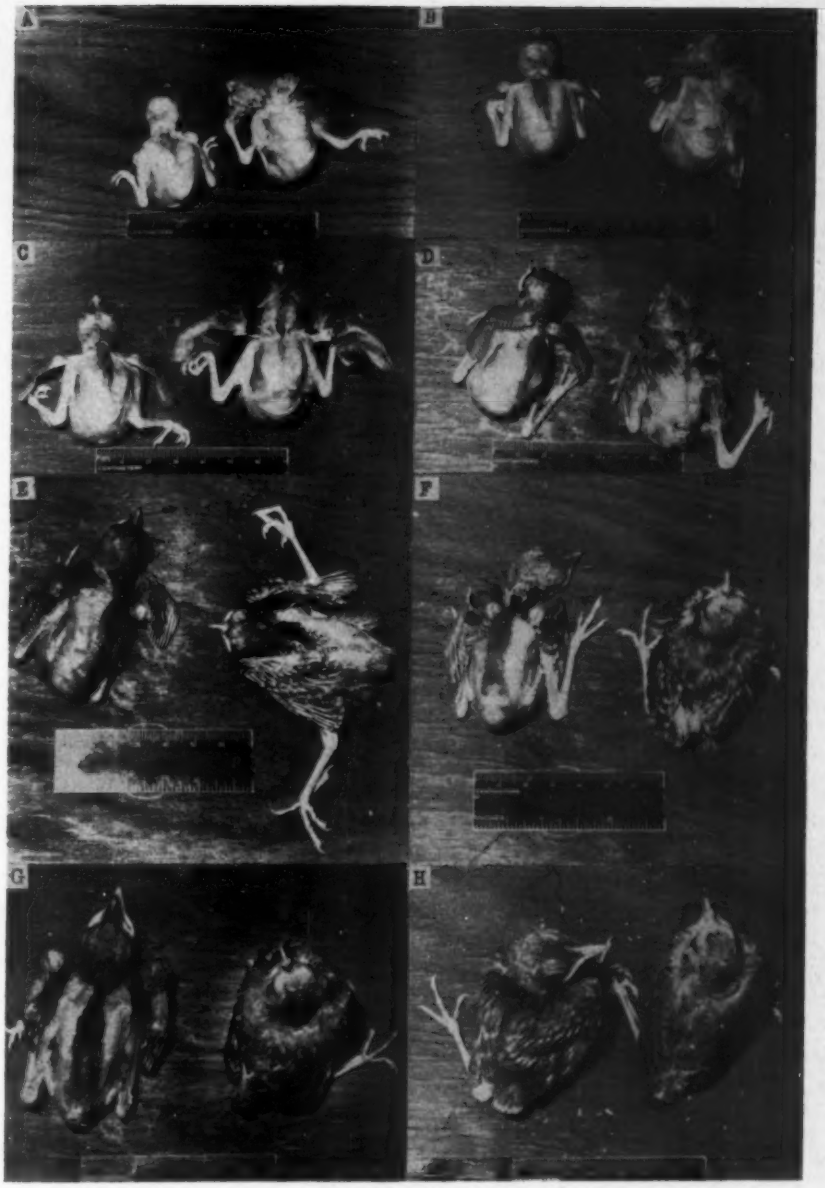

Figure 12. Daily growth of Cowbird (at right in each photo from A to H) and Wood Thrush (at left), June 4–11, 1945. See Table 5 for weights. Photos by Hal H. Harrison.

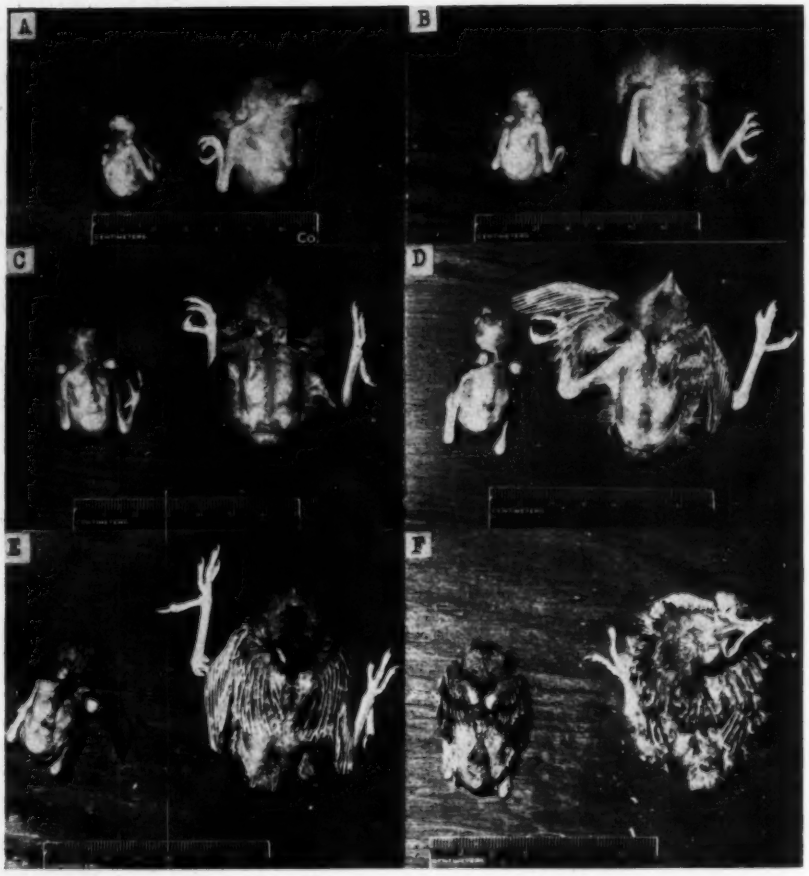

Figure 13. Daily growth of Cowbird (at right in each photo from A to F) and Oven-bird (at left), June 3–8, 1945. See Table 4 for weights.
Photos by Hal H. Harrison.

Figure 14. Two Oven-bird eggs; two young Oven-birds (left), aged 24 hours (2.11 grams) and 30 hours (3.10 grams); three young Cowbirds (right), aged 42 hours (7.48 grams), 30 hours (5.20 grams), and 30 hours (5.00 grams). Age and weight given from left to right, June 9, 1945. Photo by Hal H. Harrison.

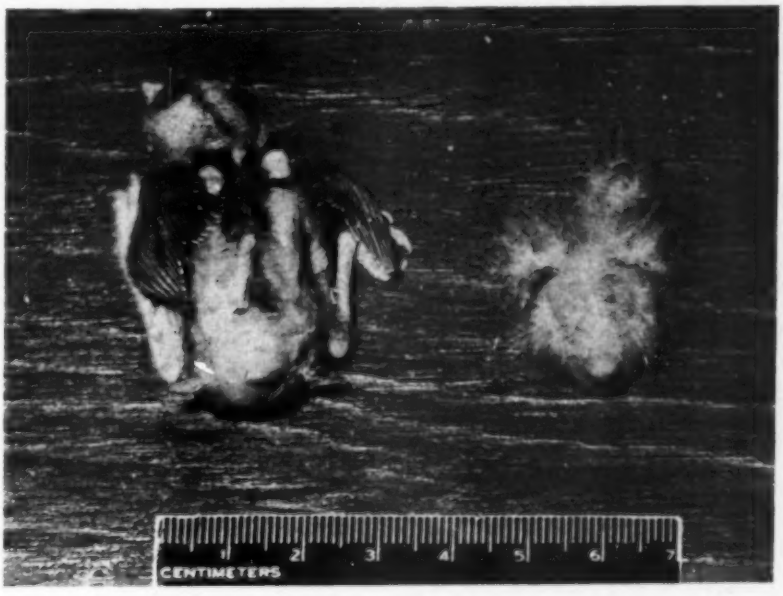

Figure 15. Young Red-eyed Vireo on left, aged 130 hours (11.8 grams); young Cowbird on right, aged 6 hours (2.60 grams), July 11, 1945. Photo by Hal H. Harrison.

TABLE 6

SUCCESS OF NESTS WITH AND WITHOUT COWBIRD EGGS, 1944-45

Species	Non-parasitized nests			Parasitized nests		
	No. nests	No. young fledged	Av. fledged per nest	No. nests	No. young fledged*	Av. fledged per nest
Catbird	25	73	2.92	0	—	—
Brown Thrasher	4	10	2.5	0	—	—
Wood Thrush	3	10	3.33	1	2	2.0
Veery	2	5	2.5	4	8	2.0
Red-eyed Vireo	1	4	4.0	0	—	—
Chestnut-sided Warbler	1	2	2.0	0	—	—
Oven-bird	0	—	—	2	3	1.5
Yellow-throat	0	—	—	0	—	—
Scarlet Tanager	0	—	—	1	1	1.0
Cardinal	1	3	3.0	2	3	1.5
Red-eyed Towhee	2	7	3.5	7	15	2.14
Chipping Sparrow	2	5	2.5	0	—	—
Field Sparrow	21	58	2.76	2	5	2.5
Song Sparrow	6	20	3.33	3	6	2.0
Totals†	35	103	2.94	19	39	2.05

* Host young only.

† For comparison, all species parasitized in the Frith are included in the table, but only nests of species that raised at least one Cowbird young and one host young are included in the totals.

The Cowbird laying season extended from mid April to mid July, with its peak in May. Until mid May most Cowbird eggs were laid in the nests of birds of field and open country, after mid May in nests of woodland birds.

A total of 73 parasitized nests were found, each of 45 containing one Cowbird egg, of 21 containing two, of 7 containing three.

Judged by egg type, two nests that each contained three Cowbird eggs were each parasitized by three females; one nest that contained three Cowbird eggs was parasitized by two; three nests that contained two Cowbird eggs were each parasitized by two females.

The time of egg laying seemed to be correlated with light intensity.

In 11 instances, Cowbirds removed eggs from hosts' nests, 7 times when two host eggs were in the nest, once when a single egg was there, once when the nest contained three host eggs, and once when the nest contained three eggs of the host and one of the Cowbird; once two eggs were removed from a nest of three, five days after incubation started.

For 32 Cowbird eggs, exact conditions of laying were known. In only 7 instances did the Cowbird lay in a nest on the day after she had removed an egg.

The Cowbird was photographed at the nests of the Oven-bird and Red-eyed Vireo.

The Cowbirds, though early risers, were usually quiet until after the eggs were laid.

The incubation period (10 eggs) ranged from 11 to 13 days and averaged 11.6 days.

Of 19 Cowbird eggs, one hatched four days before the host; 4 hatched one day before; 10 hatched the same day as the host; 3 hatched one day later than the host; and one hatched five days later than the host.

The weights of three young Cowbirds at hatching were 2.33, 1.77, and 2.70 grams respectively.

The daily rate of growth of the young Cowbird and the host young was recorded for the nest of the Oven-bird, Veery, Wood Thrush, Cardinal, and Towhee.

Records (11) of the Cowbird's age at nest-leaving averaged 8.7 days (extremes: 8 and 10 days).

Of the 45 nests in which one Cowbird egg was laid, 8 were deserted, apparently because the Cowbird laid prematurely; one was deserted even though the Cowbird's laying synchronized with the host's; 17 were destroyed; 19 produced fledglings. Of the 21 nests in which two Cowbird eggs were found, 9 were deserted, 6 were destroyed, 6 produced fledglings. Of the 8 nests in which three Cowbird eggs were found, 4 were deserted and 4 destroyed.

One Oven-bird nest was found contajning three Cowbird young, two Oven-bird young, and two Oven-bird eggs.

In the 237 observed nests, the hosts laid 668 eggs, of which 383 (57.3 per cent) hatched; the Cowbirds laid 108 eggs, of which 46 (42.6 per cent) hatched; 37.7 per cent of the host eggs, 26.8 per cent of the Cowbird eggs produced fledglings. Of the host eggs that hatched, 64 per cent produced fledglings; of the Cowbird eggs that hatched, 63 per cent produced fledglings.

With four exceptions all parasitized nests that produced young produced at least one host young.

The 35 non-parasitized (successful) nests produced 2.94 fledglings per nest; 19 parasitized (successful) nests fledged 2.05 host young per nest, indicating that each parasite was raised at the expense of about one host young.

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THE HOMING OF TRANSPLANTED YOUNG WOOD DUCKS[1]

BY ROBERT A. MCCABE

MANY areas in Wisconsin that were once the breeding grounds for Wood Ducks (*Aix sponsa*) have for the past several decades contained no breeding birds of the species. Lake Wingra and vicinity, including part of the northern city limits of Madison, was one of these areas. The last known breeding of Wood Ducks in the vicinity was in 1890, when Dr. S. H. Chase of Madison saw a brood in the "middle spring" (Wingra Springs, Figure 1) on the south shore of the lake. Other ornithologists, namely Cahn (1915), Schorger (1929), and Anderson *et al.* (1942), working in the same locality, failed to find Wood Ducks breeding. Spring and fall migrants are not uncommon: especially noticeable are the spring arrivals when they frequent the south shore. It appears, however, that for over 50 years no Wood Ducks have bred in the Lake Wingra area.

There is a record, by J. H. H. Alexander, of several pairs nesting on an oak-grown island in Mud Lake eight miles southeast of Lake

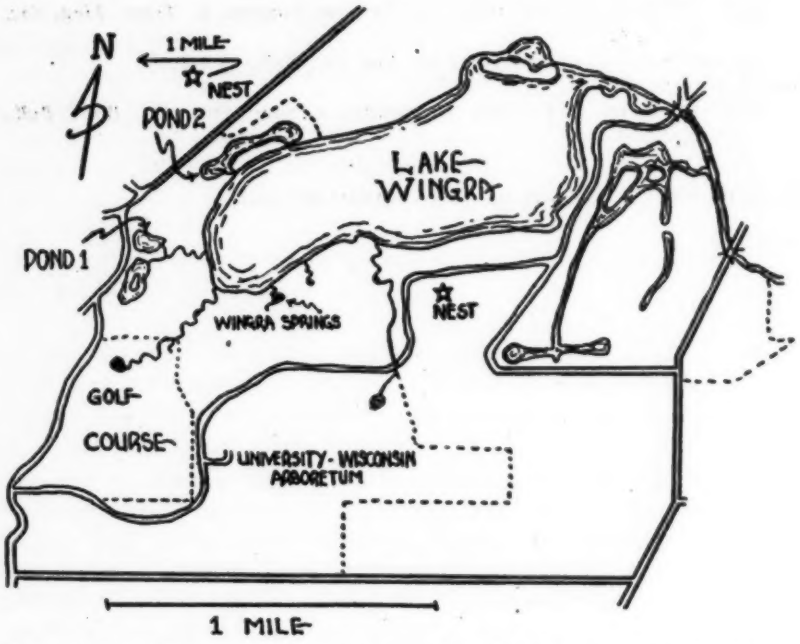

Figure 1. Lake Wingra and vicinity. Arrows indicate points at which Wood Ducks were released.

[1] Journal Paper No. 11, University of Wisconsin Arboretum.

Wingra. One of the birds observed was a female with a small brood, seen in 1915. Wood Ducks were also seen occasionally in this area by the same observer during the two decades that followed.

The University of Wisconsin Arboretum is a thousand-acre tract on the south side of Lake Wingra. On the Arboretum a series of ponds have been dug to augment the breeding grounds and refuge area for waterfowl and to add beauty to the natural springs that furnish water for the ponds. Pond 1 (Figure 1) has been the breeding area for a flock of about 100 semi-wild Mallards (*Anas platyrhynchos*) during the past 10 years. These Mallards build their nests along the walks and in the shrub beds that surround the ponds. They are very tolerant of people, noise, and activity, and the nests, if reasonably well hidden, are usually successful.

An experiment to establish a Wood Duck colony in the area was begun in 1943 with the cooperation of Frank C. Bellrose and Arthur S. Hawkins of the Illinois Natural History Survey. Two attempts (made in 1943 and 1944) to hatch Wood Duck eggs shipped by rail were unsuccessful. On August 4, 1944, the Survey sent us 100 ducklings (49 males and 51 females), all between three and five weeks of age, which had been hatched at Havana, Illinois, 200 miles from Madison. These were kept in captivity at Madison, and all but three survived.

On August 14, 25 of the largest birds (then about seven weeks old) were given red celluloid bands and released at Pond 2 (Figure 1) on the west shore of Lake Wingra. They had been banded with Fish and Wildlife Service bands before leaving Illinois. All the ducks took wing, some flying short distances, others making long flights along the shore of the lake. On August 15, 25 more birds (banded yellow) were released as follows: A large pen was placed in the shallow water of Pond 2 and the ducks placed in it. They were kept there about five hours, during which time the vicinity was kept cleared of people and dogs and the pen-door opener remained out of sight. A pull string opened the door gradually, allowing the birds to swim out undisturbed. By 3:00 p.m. the door was completely open, but the ducks did not leave until 3:40, and then they *flew* as soon as they were clear of the pen.

On August 18, 10 birds, and on August 22, 15 birds were liberated, all banded blue. The crates were opened under a fallen cottonwood in a thicket of red osier dogwood at Wingra Springs on the south shore of the lake (Figure 1). This inhibited flying, and all but one duck (which flew) walked the 10 yards to the spring creek and swam out into the lake. The remaining 22 birds were banded green and released September 3 on the north edge of Pond 2.

Most of the birds (the first 50 and the last 22) were released at Pond 2 because it is large, close to the lake, and less frequented by people. But within three days after the first release, most of the birds

were seen in Pond 1, apparently decoyed there by the resident semi-wild Mallards. The last release went immediately to Pond 1, and no Wood Ducks were seen on Pond 2 after August 30. Birds from all the releases were observed at Pond 1, and many of them became very tame. A few remained for the winter, apparently influenced by the wintering Mallards, but most of the Wood Ducks had left by November 3.

During the two and a half months of their stay in the Lake Wingra area, 17 counts were made at the regular loafing spots. As many as 33 birds were counted in a single day (Table 1).

During the winter, a female was seen on December 12, a pair on December 17, and a female on March 8, all on one of the Arboretum creeks. A pair was seen on the spring creek that drains the Nevin Fish Hatchery ponds, three miles south of the Arboretum ponds, on December 30 and on February 6.

The first Wood Ducks (eight) were seen back on Lake Wingra on April 1, 1945, and were then seen regularly until May 1. Although 25 nest boxes, built according to a special design sent us by the Illinois Natural History Survey, had been set out, none was used, perhaps because we did not put sawdust in the boxes until May 14. Wood Duck boxes were set out because (1) during the CWA days most of the dead trees were cleaned out of the Arboretum woodlots, thereby eliminating most of the potential nesting cavities; and (2) it would be easier to capture nesting females in boxes to determine whether or not they were birds of the release.

On May 21, a nest was found in the Lake Forest residential section adjoining the Arboretum. The nest tree, in a yard adjacent to a house, was a dead white oak with only two large forks remaining, in one of which was a cavity that the Wood Ducks were using as a nest. The male of the pair was seen only once, and then in flight, but the female was from the blue release of 1944. This was the first breeding Wood Duck recorded at Lake Wingra in 50 years. The female incubated at least three weeks, but the ultimate fate of the nest was not determined.

On May 22 a second nest was found, at the Forest Hill cemetery midway between Lake Wingra and Lake Mendota (about a mile from

TABLE 1

COUNTS OF WOOD DUCKS, FALL, 1944

	August						September					October		November			
Date	19	21	22	25	27	30	5	8	12	15	21	4	6	20	31	1	3
Pond 1	6	7	19	29	13	27	22	9	26	18	10	6	7	11	6	9	0
Pond 2	3	12	0	2	0	0	—	—	0	0	0	0	0	—	—	—	0
Lake Wingra	19	4	0	0	0	0	—	—	1	0	0	—	—	—	—	—	0
Spring Creeks	—	—	—	—	—	6	—	—	2	0	—	—	—	—	—	—	—

(—) indicates that the location was not visited on the date in question.

each). The cavity, about 15 feet from the ground and opening to the north, was in a large live soft maple. Since its floor was only an inch below the opening, the incubating bird could be seen from the ground. The female proved to be one of the red release. I opened one egg, which showed that the clutch had been incubated about 11 days, and the nest was kept under observation. When the eggs hatched, on June 12, there was water in the nest from a heavy rain, and I removed the adult and the 10 ducklings to a holding pen in the Arboretum. One duckling escaped and died during the night. The adult and the other 9 ducklings were released on Pond 2, June 13.

It is interesting (though perhaps a mere coincidence) that the duck found nesting south of Lake Wingra had been released on the south side of the lake (blue release), and the bird found nesting to the west had been released on that side of the lake (red release).

During the summer, three broods, which were thought not to be from either of the nests described above, were seen; the total of nesting pairs, therefore, was probably five. Only one male duck was seen during the nesting season.

On December 30, 1945, a flock of six or eight Wood Ducks was seen on one of the Arboretum creeks; on January 31, a male of this flock was trapped and proved to belong to the blue release; the same bird was retrapped two weeks later at the Nevin Fish Hatchery, where Wood Ducks had been seen the first winter after the releases.

In the spring of 1946, the first Wood Ducks were seen on Lake Wingra on April 6. During the next month, many flocks and pairs were seen on all parts of the lake shore and in the Arboretum creeks and ponds. On April 11, 20 new nest boxes were set out and the old boxes reopened. A week later, four boxes contained breast feathers of female Wood Ducks, but none of the boxes was actually used for nesting that season. The nest cavity in the dead white oak used the previous year was used again, but a wind storm broke the snag, and the bird deserted. Two pairs of Wood Ducks were seen almost daily on the Arboretum ponds until about July 10, but no broods were seen in the vicinity.

Two Wood Duck broods (probably young of our released birds) were seen during the summer of 1946 on University Bay, of Lake Mendota, about two and a half miles from the original release site. Nesting Wood Ducks had been absent from this bay for as long as they had from Lake Wingra. One of the broods (12 to 14 ducklings) stayed about three weeks; the other brood (11 ducklings) dwindled to 5, which presumably flew south.

None of the birds released at Lake Wingra was found in Havana, Illinois, 200 miles away, where they had hatched and had their first three to six weeks of rearing. The area surrounding the hatching place is a thoroughly studied Wood Duck nesting area, and any ducks

that returned there would have undoubtedly been found in the nest boxes of the colony, which were periodically checked. Thus it appears that the point to which a duck returns is the place from which it leaves in autumn—the place where it learns to fly. With our ducks it was a matter of two to two and a half months between the start of learning to fly and the departure for the south. There remains to be determined the minimum time required at a release point for the birds to fix the locality in their "minds" so that they will return there the following spring.

A similar experiment was performed in Finland by Välikangas (1933). Here Mallard (*Anas platyrhynchos*) eggs from Britain were hatched and the young subsequently banded and released. All migratory and breeding recoveries were en route to or in Finland.

In 1944, 95 young Wood Ducks were sent from the Illinois Natural History Survey to Indiana, where they were released by O. D. McKeever in the Jasper-Pulaski State Game Preserve (near Wallace Lake, 180 miles from the place of hatching), where there was already a small colony of Wood Ducks established. Of 15 nests on the area the following spring, 4 (and perhaps 5) belonged to females from the experimental release (*Pittman-Robertson Quarterly,* Oct. 1945). (The eggs for both the Indiana and the Wisconsin experiments were collected from clutches laid by wild Wood Ducks at Havana, Illinois.)

As a game management practice, the transplanting procedures here described appear to be an effective means of establishing a Wood Duck colony in areas now devoid of breeders. Transferring Wood Duck eggs into nests of locally nesting semi-wild Mallards is in my opinion another method of starting a colony, despite the fact that the eggs we shipped by rail from Illinois for this purpose were damaged en route in two consecutive years, 1943 and 1944. Shipping by air or automobile might eliminate such damage.

Summary

In August 1944, 97 young Wood Ducks, hatched and partially reared in Illinois, were raised to about seven weeks of age and released at Madison, Wisconsin, 200 miles from the hatching site.

A few wintered in the area of the release.

Ducks of both sexes from the release returned to Madison to breed, both in 1945 and 1946.

None of the ducks of the release was found in the area of hatching.

A similar release of young Wood Ducks, hatched in Illinois, was made in 1944 in Indiana. At least four females returned to Indiana to breed.

ACKNOWLEDGEMENTS

Grateful appreciation is expressed to the Illinois Natural History Survey, especially to Frank Bellrose, Arthur Hawkins, and Harold Hanson, for allowing us to participate in the homing experiment and for furnishing the ducklings; to Mrs. Arthur Koehler, Mrs. A. F. Gallistel and Mr. D. W. Pahl of Madison for calling my attention to Wood Duck nests or broods; to Arnold Jackson, Jr., and Allen W. Stokes, research assistants who helped in all phases of the project; to Professor Aldo Leopold, research director, for guidance and for checking the manuscript.

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GENERAL NOTES

An Ohio record for the Wood Ibis.—On May 5, 1946, I observed a stork-like bird wading in a small tributary of Todd's Fork near the city of Wilmington, Ohio. Study at close range showed the bird to be an immature Wood Ibis (*Mycteria americana*). It appeared to be in a weakened condition, although on my approach it was able to execute short flights of approximately one hundred yards along the stream.

Returning to the spot later that evening I was able, in the semi-darkness, to approach the Wood Ibis quite closely and capture it. Special attention was given to proper feeding of the bird, and it ate heartily but failed to survive. The skin of this specimen, a female, is in the bird collection of the Ohio State Museum.

There is one other record of a Wood Ibis in Ohio, that of H. E. Chubb, who collected a specimen near Cleveland in 1879 (J. M. Wheaton, 1882. Report on the Birds of Ohio, p. 497).—FRANK O. HAZARD, *Wilmington College, Wilmington, Ohio.*

Survival of a brood of Cooper's Hawks.—On June 24, 1942, we banded five nestling Cooper's Hawks (*Accipiter cooperii*) four miles east of Ann Arbor, in Section 30, Superior Township, Washtenaw County, Michigan.

Four of the five nestlings have been recovered as follows:

1. November 11, 1942 (about 5 months after banding). Shot at Decatur, Indiana.

2. March 3, 1944 (20 months after banding). Caught in a mink trap at Salt Lick, Kentucky.

3. November 30, 1946 (5 years and 5 months after banding). Found dead, "probably shot," at Trilby, Lucas County, Ohio.

4. February 12, 1947 (5 years and 7 months after banding). Shot while feeding on a pheasant at Brookpark Village, Cuyahuga County, Ohio.—F. C. and J. J. CRAIGHEAD and WILLIAM H. LAWRENCE, *University of Michigan, Ann Arbor.*

The Mangrove Cuckoo in interior Tamaulipas, Mexico.—During the summer of 1946 we camped for two days on the southern edge of the Mesa de Llera, sometimes known as the Mesa de la Angostura, approximately 35 miles south of Victoria, Tamaulipas. The Mesa is near the town of Llera, which is close to the Pan-American Highway crossing of the Rio Guayalejo.

On June 17 we heard and later collected a strange-sounding cuckoo in a mesquite-cactus association on top of the Mesa. It proved to be an adult male Mangrove Cuckoo, *Coccyzus minor continentalis* (testes 9 mm. × 4 mm.). Later in the day the same call was heard again, coming from a small valley below the Mesa.

Only a few records of the occurrence of this species in northeastern Mexico have been published, and these are restricted to a very few localities in the coastal lowlands. The Mesa de Llera, however, rises approximately 1,400 feet above sea level and is somewhat more than 70 miles from the Gulf Coast. The area on the Mesa where we collected the Cuckoo was covered with a thick growth of mesquite and cactus reaching a maximum height of 10 feet, interspersed with smaller shrubs and heavy grass. The edge of the Mesa dropped away sharply about 200 feet to a small valley, whence the call of the second Mangrove Cuckoo was heard. There the conditions seemed more evenly humid than on top of the Mesa or on the lower slopes leading down to the Rio Guayalejo.

In the crop of the Cuckoo we found a large grasshopper of a kind that was very abundant on the Mesa. This suggested a possible explanation for the occurence of the Mangrove Cuckoo in such an unusual habitat, namely, that the birds had moved up from the coast along the moist valley of the Rio Guayalejo and then had found on the near-by mesa an abundant supply of food.—STEPHEN W. EATON and ERNEST P. EDWARDS, *Laboratory of Ornithology, Cornell University, Ithaca, New York.*

Barred Owl thirty miles from land.—I am indebted to John B. Metzenberg, of Chicago, for the following report of a Barred Owl (*Strix varia*) observed over Lake Michigan during daylight hours.

On August 22, 1946, while sailing his 46-foot schooner northward on Lake Michigan, Mr. Metzenberg and a crew of four associates sighted a Barred Owl flying just above the waves in the vicinity of their boat. When first noticed at 8:00 a.m., the owl was near mid-lake, approximately 30 miles west of Pentwater, Michigan, and about 35 miles east of Sheboygan, Wisconsin. A moderate northwesterly breeze, estimated at 8 to 10 miles per hour, was blowing at the time and had not varied during the previous 36 hours. Visibility was good, although a light overcast somewhat obscured the sun.

The owl made repeated attempts to perch on the swaying 49-foot mainmast before finally succeeding. Later it perched, more comfortably, on the "spreader," only 20 feet above the deck, and on the shrouds. The proximity and activity of several men on deck held the owl's attention, but apparently caused the bird no great anxiety. At intervals of 10 to 15 minutes it left the boat briefly and flew aimlessly over the lake, occasionally disappearing in the distance. The owl returned to the boat repeatedly over a two hour period to resume one of its earlier perches, but finally disappeared to the eastward at 10:00 a.m. and was not seen again.—EMMET R. BLAKE, *Chicago Natural History Museum, Chicago, Illinois.*

Status of the Anna Hummingbird in southern Arizona.—In 1941, Gale Monson and I reported briefly (*Condor,* 43:108–112) on the principal findings of several short trips in southern Arizona. We considered an Anna Hummingbird (*Calypte anna*) taken at Patagonia, Arizona, December 3, 1939, "a late fall transient," and stated that there were no published winter records for southern Arizona. Later, Godfrey (1944. *Auk,* 61:149–150) reported a December 24 specimen from Yuma as a "winter" record; and van Rossem (1945. *Condor,* 47:79–80), summarizing data available to him, implied that we had overlooked Willett's records for Roosevelt Lake (though this is a *central* Arizona locality). It seems desirable, therefore, to present a full account of our views on the migration of this hummingbird.

Since 1938, Mr. and Mrs. William X. Foerster and I have kept records of birds seen about Tucson. Tree tobacco (*Nicotiana glauca*) and other shrubs were planted in our yard late in 1937; the tobacco blossomed well until 1942, and it proved a definite attraction to hummingbirds. Among these, the Anna proved to be a regular visitor in fall, often remaining until late December. Our records were as follows:

	No. of records	Last record
1938	3–4	Nov. 25
1939	8	Dec. 20
1940	2–3	?Dec. 28
1941	26	Jan. 8, 1942
1942	9	?Jan. 21, 1943
1943	4	?Dec. 15
1944	1 (Dec. 27)	

By 1945 Annas had been found to occur so regularly that, although six or eight were seen, only one (November 21) was recorded in our notes. Our earliest seasonal record (of a female) was September 24 (1941), and as shown above the species lingers regularly to late December and occasionally into January, at least to January 8. There is no question, however, that most of the birds depart by the end of December.

To what extent visits to our yard by the same bird on different days may have increased our totals above the actual number of birds present, I cannot tell. The maximum seen in the yard at one time was two birds. The large total in the fall of 1941 was probably due in considerable part to a female that roosted in the hedge up to October 25 and which attracted at least one male at times, "courtship" flight being observed in October. On the other hand, collecting of three adult females in the first half of November 1939 did not end the visits of the species that fall. These three specimens were judged, from the appearance of their ovaries, to be more than a year old. Though adult males also constitute a part of the Anna Hummingbird population of southern Arizona, females and young seem to be in the majority.

In addition to those seen in our yard, Anna Hummingbirds have been seen in other parts of the Tucson Valley and on the south slope of the Santa Catalina Mountains. Further observation may show the species to be more common in the oaks of the mountains than in the valleys, and to remain in small numbers in warm, south-facing canyons in the foothills through the winter. But I regard two facts as well established: 1. The Anna Hummingbird is the latest of all the transient hummingbirds to appear in Arizona and is the only hummingbird occurring regularly in the Tucson Valley after early October. 2. The bulk of the Annas leave the valley by the end of December. Their departure may be correlated with the cold mid-winter nights, when the tree tobacco finally ceases to bloom (in this valley, it usually blooms from late February or early March to late December).

Where, then, do the bulk of the Anna Hummingbirds of southeastern Arizona go in December? There is no evidence that they continue farther east or south; the one record for Texas (Brewster County) is in October (Van Tyne and Sutton, 1937. *Univ. Mich. Mus. Zool. Misc. Publ.*, 37:44). Willett (1915. *Condor*, 17:102) has shown that Annas winter farther north, in the low valleys of central Arizona, but I suspect that they will prove to be just as common there in October as in January. If so, the southeastern Arizona birds must go west. But in the deserts of southwestern Arizona and southeastern California, the common winter hummingbird seems to be the Costa (*Calypte costae*). My belief is that the bulk of the Anna Hummingbirds of southern Arizona return in December *to their breeding grounds*, which are relatively warm and moist in winter. The height of the nesting season is in February and March, but incubated eggs have been taken by late December (Willett, 1933. *Pac. Coast Avif.*, 21:97). Comments on its abundance in southwestern California cover nearly every month except October and November, when the Arizona population is at its maximum; it would be interesting to know whether a measurable decrease occurs at that time in California.

It is also noteworthy that there is no evidence of a return flight in spring in southern Arizona. As to fall arrival, the earliest authentic record seems to be September 4 (Sacaton, Arizona), all alleged August specimens I have examined being either immature *Archilochus alexandri* or of questionable date. Normal occurrence in southern Arizona seems definitely to be from late September to late December only.

Seasonally, then, we cannot term the Anna Hummingbird a "winter" bird in southern Arizona; yet biologically it certainly *is* a winter resident, migrating here

from its breeding grounds, spending some time, and then returning. The best term for such an unorthodox migrant would seem to be "autumn visitant."

For the privilege of examining specimens and notes, I am indebted to L. C. Sanford, Gale Monson, E. C. Jacot, Randolph Jenks, Mr. and Mrs. Hugh P. Dearing, Mr. and Mrs. William X. Foerster, Mr. and Mrs. Ross J. Thornburg, and the authorities of the American Museum of Natural History, the United States National Museum, and the U. S. Fish and Wildlife Service.—Allan R. Phillips, *Museum of Northern Arizona, Flagstaff, Arizona.*

Air speed of Belted Kingfisher.—In the spring of 1946 while travelling in central Colorado, a companion and I recorded the speed of a Belted Kingfisher (*Ceryle alcyon*) as it flew for a distance along U. S. Route 50 in the Arkansas River Canyon between Canon City and Salida. For several miles the canyon walls are very precipitous, rising a thousand feet or more from the stream bed. Passing through this, the deepest part of the canyon, where the road is separated by only a few feet from the river, we noticed a Belted Kingfisher flying upstream in a course parallel to our car. We were travelling at 30 miles per hour when the bird, flying with apparent ease, came in range of our vision from behind. To keep pace with the bird we increased our speed to 35 and then to 40 miles per hour. At this speed we stayed abreast of the bird for 1.8 miles before it again drew ahead of the car. We increased our speed to 45 miles per hour and were thus able to follow it 0.4 mile farther, when we were forced to reduce speed because of a rock slide partially blocking the highway, and the Kingfisher was lost to view. I estimated that the Kingfisher had been flying with a wind velocity of one to three miles per hour to assist him.

In all, we had successfully followed this bird for a total distance of 2.2 miles from the point of first observation. At no time had the distance between us and the bird been greater than 10 or 12 yards. In order to maintain this distance it had been necessary for us to increase our speed from 30 to 40 and finally to 45 miles per hour. D. D. McLean (1930. *Gull*, 12, No. 3: [p. 2]) recorded "steady level flight" of 36 miles per hour for the Belted Kingfisher (in California). All during our observation the Kingfisher flew with apparent ease and remained between 10 and 15 feet above the water's surface, following each curve and bend of the river consistently. It showed no alarm or anxiety because of the nearness of the automobile. Observation and alertness, however, were evident in the continual turning of its head from side to side during the flight.—Lee J. Burland, *138½ River Street, Oneonta, New York.*

Purple Martins feeding on emerging may-flies.—On the evening of August 2, 1946, I observed at Shafer Lake, White County, Indiana, what I at first supposed was a large feeding school of white bass (*Lepibema chrysops*) about a third of a mile from my boat. (These bass travel about open water in schools and in the summer months feed at the surface, making splashes that can be seen from a considerable distance.) On closer approach, however, I found that the splashes I had observed were being made by Purple Martins (*Progne subis*) and a smaller species of swallow (either Bank or Rough-winged) which were feeding on may-flies (Ephemeroptera) that were coming to the surface to molt. This emergence was taking place along the east shore of the lake for about 1,000 yards and out into the lake for perhaps 400 yards. Often the birds picked the insects from the water, making hardly a splash. Almost as often, however, they made a large splash, sometimes almost disappearing beneath the water. The flies actually on

the surface were so abundant that it does not seem likely that the birds were attempting to capture those still under water, but I can offer no other explanation for the splashing. This feeding activity continued for the remaining half-hour of daylight.—CARL D. RIGGS, *University of Michigan, Ann Arbor.*

House Wren feeding a Cowbird.—Three times during one period of observation on July 20, 1946, I saw a House Wren (*Troglodytes aëdon*) feed a large (40.5 grams) Cowbird (*Molothrus ater*) near our house on the Edwin S. George Reserve, Pinckney, southeastern Michigan. Friedmann (1929, "The Cowbirds," p. 255) states that the House Wren is a "rarely imposed upon species. It is merely mentioned as a molothrine victim by Bendire and also by Davie, while Kells, (Auk 1885, p. 106), in Ontario, writes that during 1884 he found young Cowbirds in the nests of several species among which he lists the present one."

The only Wren family near our house had four young Wrens two or three days old in a nest box eight paces from where the Wren was feeding the Cowbird. It seems possible that the male Wren was caring for a Cowbird from an earlier Wren brood while the female was looking after the newly hatched young; on the other hand, he may have adopted a young Cowbird that had been reared by other foster parents.—FRANCES HAMERSTROM, *Edwin S. George Reserve, Pinckney, Michigan.*

Birds eating blossoms.—Search of a considerable number of publications discloses only a few records of the eating of blossoms by birds other than the gallinaceous browsers. In Baltimore in 1945 and 1946 I occasionally found English Sparrows (*Passer domesticus*) feeding on the petals and stamens of apple, pear, and cherry blossoms, and once saw a Mockingbird (*Mimus polyglottos*) feed similarly between phrases of song in an apple tree. Mention of this to fellow-members of the Lancaster County, Pennsylvania, Bird Club produced in the club's *Bulletin* (No. 9, 1946:10–11) notes by Louise F. A. Tanger on a Cardinal (*Richmondena cardinalis*) eating forsythia blossoms and by Mary Grebinger on Cedar Waxwings (*Bombycilla cedrorum*) in an apple tree "tearing the petals off, holding them in their beaks for a moment, and then letting them fall." I have found records of English Sparrows eating pea and bean flowers (*U.S. Dept. Agric. Tech. Bull.* 711, 1940:30), Galapagos Finches (*Geospiza* spp.) eating various flowers (*Condor* 47, 1945:179, 188), and (in England) the Marsh-Tit (*Parus palustris dresseri*) and Wood-Pigeon (*Columba p. palumbus*) feeding on plum blossoms (*Brit. Birds*, 36, 1942:141).—HERVEY BRACKBILL, *4608 Springdale Avenue, Baltimore 7, Maryland.*

Period of dependency in the American Robin.—Observations on five American Robins (*Turdus migratorius*) color-banded as nestlings in Baltimore, Maryland, make it possible to elaborate on the following statement by Howell (1942. *Amer. Midl. Nat.*, 28:583): "It appears that the young are dependent on the parents, and the male in particular, for less than four weeks. While young that are four weeks old do beg from their parents, they receive little assistance." Of the five birds I watched, two were from first broods, and three from a second brood. Attempts at self-feeding began at about the age of 20 days; most of the fledglings remained partly dependent through the age of 28 to 31 days; and they remained in the home territories through the age of 30 to 38 days. The observations on each bird are as follows:

O-RA: Hatched night of April 21-22, 1945; left nest May 6, aged 14 days; next seen May 12, aged 20 days, picking at ground ineffectively; first seen to obtain food (inanimate) May 16, aged 24 days; last seen fed by parent May 23,

aged 31 days; last seen in territory May 30, aged 38 days. (This bird, the only one raised from its nest, was cared for entirely by the female parent both in the nest and out. May 23, on the evening of which it was still being fed, was the day on which the female completed her second set of 4 eggs; both daytime incubation and night-roosting on the nest began on this day.)

O-WA: Hatched May 2 or 3, 1945; left nest May 16, aged 13 or 14 days; next seen May 20, dependent; first seen to pick at ground, apparently effectively at times, May 23, aged 20 or 21 days; last seen fed by parent May 23, but still in close company of one parent and probably fed May 31, aged 28 or 29 days; apparently independent June 1, aged 29 or 30 days; last seen in territory June 5, aged 33 or 34 days.

A-RG: Hatched June 4, 1945; left nest June 17, aged 13 days; partly independent by June 24, aged 20 days; last seen fed by parent June 28, aged 24 days; definitely independent July 9, aged 35 days; last seen in territory July 11, aged 37 days.

AR: Hatched June 4, 1945; left nest June 17, aged 13 days; partly independent by June 24, aged 20 days; last seen fed by parent June 27, aged 23 days; last seen in territory July 4, aged 30 days.

AW-O: Hatched June 4, 1945; left nest June 17, aged 13 days; partly independent by July 1, aged 27 days; fed by parent as late as July 4, aged 30 days, and probably July 7, aged 33 days; last seen in territory July 8, aged 34 days.

Observations of fledgling O-RA throw some light on the development of self-feeding ability. As stated above, this bird at the age of 20 days sometimes pecked sharply at the ground in a way that looked purposeful but was entirely ineffective: watched at close range as it stood on bare ground, no targets of the pecks could be discerned, and no swallowing was apparent afterward. At 24 days, however, O-RA was successfully picking cherries from a tree.

At 28 days, O-RA was having a little success with animate food. Foraging over lawns, it ran and paused, and gazed intently, like an adult. But it was usually too slow in snatching at its quarry, and I repeatedly saw the insects it struck at fly safely away. It was also making erroneous food choices, as shown when it once picked up some object and then promptly dropped it.

At 30 days, O-RA spent more of its time than before in quest of live food, but still seemed to stab too slowly to catch many insects, still erred in its choices, and learned only slowly from its mistakes. Once, for instance, it picked up some rotted leaves—and this with a quick pounce, as if they were moving prey—but immediately dropped them with a shake of the head that seemed to mean that they were distasteful; nevertheless, it almost at once picked up another piece of rotted leaf, discarding it in the same way.

An incident that seems to show a parent influencing its offspring to feed itself occurred during my observation of fledgling O-WA. Occasionally picking up some food itself, but chiefly being fed by its male parent, this bird when 20 or 21 days old once flew up onto my pull-string banding trap. Shortly the male parent appeared with a billful of bread. He did not fly directly to the fledgling and feed it, however; he alighted on the ground a few yards away, walked a little nearer, then flew up and past the young bird, landing on the ground a couple of yards beyond; he repeated this several times. Then, a few times, he walked toward O-WA and retreated again. Once he put his whole load of bread down on the ground, and then picked it up again, piece by piece. During all of this time the fledgling had been begging on the top of the trap, and now it finally flew down to the male on the ground and was fed, following which, the male flew away. The male's behavior was not caused by fear of the trap; he had been feeding there regularly himself, and just before this occurrence, he had got food there and fed O-WA beside it.—Hervey Brackbill, *4608 Springdale Avenue, Baltimore 7, Maryland.*

Aberrant sexual behavior in the American Robin.—At Baltimore, Maryland, on May 31, 1946, an adult American Robin (*Turdus migratorius*) copulated four times in about half a minute with a fledgling that was less than 24 hours out of the nest.

The fledgling was squatting upon my lawn, and the adult was already copulating when I first noticed the birds from a window 20 yards away. The adult dismounted, moved a few yards in front of the fledgling, then flew back and copulated again. Twice more, at intervals of several seconds, this behavior was repeated, the young bird remaining all the while in its original squatting position. When the adult moved away again, I left the window for a matter of seconds to get a binocular; upon returning, I found only the fledgling on the lawn, but on the roof of a garage a couple of yards away was the color-banded male of a pair that had nested next door, and when shortly the fledgling flew into a bush, I saw by its color band that it was one of this male's own offspring. Since my lawn was a jealously-defended part of the male's territory, and there had been no sound of conflict while I was getting my binocular, there is little doubt that he himself was the bird I had seen copulating with his fledgling.

The incident occurred at 6 a.m. The young bird had left the nest the day before (May 30), some time between 6 a.m. and 4:15 p.m., at the normal nest-leaving age of 13 to 14 days.—Hervey Brackbill, *4608 Springdale Avenue, Baltimore 7, Maryland.*

Choice of nest-site in the American Robin.— Assuming that the female American Robin (*Turdus migratorius*) generally selects the site of the nest she builds, successive nestings of color-banded females at Baltimore, Maryland, indicate that some birds show a limited amount of preference for a particular type of nest site but others show none.

Three nests of one female were all about 8½ feet above the ground, but otherwise the locations differed. The first nest in 1945 was in a 10-foot spruce, the second in a rose vine on a trellis against a house. The second in 1946 (the first was not found) was on a grape arbor. I believe this bird's mates (unbanded) in the two years were different ones.

Five successive nestings of a second female have been observed, and, except for the re-use of one nest, there were no similarities. The first nest in 1945 was 11 feet up in a climber rose on a porch; this nest was re-used but collapsed with the nestlings; the third nesting was 15 feet up in a 20-foot apple tree. The first nest in 1946 was 9½ feet up in a 12-foot lilac, and the second 22½ feet up in a tall pin oak. This bird had different mates in the two years.

Two successive nests of a third female were found. The first was on the top edge of a second-floor window shutter and was destroyed during the incubation period; the second nesting was 6 feet up in a 6½-foot bush.—Hervey Brackbill, *4608 Springdale Avenue, Baltimore 7, Maryland.*

EDITORIAL

Under present conditions it seems to be impossible to prevent the mailing of a few *Bulletins* that are in some way defective. We can only express our regret and ask that Members let us replace them with perfect copies. If Members will return the defective copies to the Editor, it will help him to learn just what errors have been made and to take steps to prevent their repetition.

We are glad to have Members send in duplicate copies or copies of the *Bulletin* that they no longer need. We can usually put such copies to good use, especially now that we need to replace sets of the *Bulletin* in war-damaged European libraries. However, only in the case of rare numbers is the Club justified in buying copies or exchanging others for them. The only rare numbers among those published in the last twenty years are those for March 1930 and for March 1941. Members will do the Club a great service by sending in any spare copies of these two issues.

A "Book Purchase Fund" has been started by Members interested in providing for the purchase of books, especially new books, for the Wilson Ornithological Club Library. The money already received makes possible the purchase of several of the books in greatest demand. Members who wish to make contributions, however small, to this Fund should send their gifts to the Club's Treasurer.

OBITUARY

Percy A. Taverner, dean of Canadian ornithologists, died in Ottawa on May 9, 1947, aged seventy-one. He was a British Empire Member of the British Ornithologists' Union and a Fellow and former Council member of the American Ornithologists' Union. He had been the curator of the bird collection of the National Museum of Canada for many years and was made Honorary Curator of Birds when he retired in 1942. His publications included many papers on the classification, distribution, and conservation of Canadian birds and several excellent manuals: "Birds of Eastern Canada" (1919), "Birds of Western Canada" (1926), and "Birds of Canada" (1934).

J. Warren Jacobs, student of the eggs and nesting habits of birds, died February 27, 1947, at Waynesburg, Pennsylvania, at the age of seventy-eight. The value of his work was recognized by his election to Membership in the American Ornithologists' Union in 1904.

Ornithological News

Theodora Nelson has been appointed Editor of the Transactions and Proceedings of the Linnaean Society of New York.

Albert F. Ganier has retired from the editorship of the *Migrant*, official publication of the Tennessee Ornithological Society. He had been Editor of the *Migrant* for several years and had been on its editorial staff since its founding seventeen years ago. His successor is James T. Tanner, Assistant Professor of Zoology at the University of Tennessee and the author of "The Ivory-billed Woodpecker" (1942).

Frederick C. Lincoln, who is now Assistant to the Director of the United States Fish and Wildlife Service, has announced a reorganization of the Section of which he was formerly chief:

"The Section of Distribution and Migration of Birds is now divided into two units. The first, which continues the name of the old Section, will be under the leadership of Dr. John W. Aldrich as Chief. For the past year he has served as Assistant Chief. Dr. Aldrich has his headquarters in the U.S. National Museum in Washington, from which point he will direct the work on bird banding and bird migration, including the work at the Patuxent Research Refuge. He also is in charge of the Service collections of birds, most of which are incorporated in those of the National Museum.

"The second unit, Waterfowl Management Investigations, will be under the direction of Mr. Cecil S. Williams as Chief. His headquarters will be at the central offices of the Service in the Merchandise Mart, Chicago, Illinois. The flyway biologists will operate under his direction."

Richard L. Weaver, who was Educational Director of the Audubon Nature Center at Greenwich, Connecticut, has been appointed Program Director of the North Carolina Resource-Use Education Commission at Chapel Hill.

Austin L. Rand, of Ottawa, Ontario, has been appointed Curator of Birds of the Chicago Natural History Museum, with Emmet R. Blake as Associate Curator.

Alexander Sprunt, Jr., has been awarded a Guggenheim Fellowship for the preparation of a book on the birds of South Carolina.

NEW LIFE MEMBER

LILLIAN C. STONER finished her collegiate work at the State University of Iowa, and later acted as assistant ornithologist on the Barbados-Antigua and the Fiji-New Zealand expeditions which were sponsored by the University. Her interest in birds increased with the years as she assisted her late husband, Dayton Stoner, in his bird banding and his studies of temperature and growth in Bank, Barn, and Cliff Swallows. At present, Mrs. Stoner is associated with the New York State Museum and is completing for publication a regional study, "Birds of Washington Park" (Albany, New York), which was made jointly with Dayton Stoner. Mrs. Stoner is a Patron of the American Ornithologists' Union and an active member of a number of other scientific societies.

NEW LIFE MEMBER

MARGARET MORSE NICE received the A.B. degree from Mount Holyoke College and the A.M. from Clark University. She is best known for her great study of the Song Sparrow, for which the American Ornithologists' Union awarded her the Brewster Medal, but she is also the author of the "Birds of Oklahoma" and of many papers on the life history and behavior of birds. She is an Associate Editor of *Bird Banding* and of *The Wilson Bulletin* and has always devoted much time and energy to helping fellow ornithologists perfect their manuscripts. Mrs. Nice is a past President of the Wilson Ornithological Club, a Fellow of the American Ornithologists Union, and has been given honorary membership in the leading ornithological societies of Europe.

REPORT OF THE TREASURER FOR 1946

Balance as shown by last report, dated Dec. 31, 1945.		$ 541.60
Receipts, Jan. 1 to Dec. 31, 1946		
Dues:		
Associate	1558.05	
Active	1411.70	
Sustaining	379.75	
Subscriptions to *The Wilson Bulletin*	189.75	
Sale of back issues of *The Wilson Bulletin* and of reprints	173.81	
Interest from Endowment Fund	141.81	
Contributions for printing of insert plates	25.00	
Gifts: miscellaneous receipts	6.68	
Total receipts		$4428.15
Disbursements		
The Wilson Bulletin: printing, engraving, mailing	$3501.17	
President's expense: printing, postage	5.00	
Editor's expense: reprints, postage, secretarial aid	375.50	
Secretary's expense: stationery, postage, clerical aid	236.04	
Treasurer's expense: stationery, postage, clerical aid	140.19	
Membership Committee's expense: postage, printing	54.53	
Bank charges; foreign exchange; corporation papers	5.44	
Annual Meeting expense	72.93	
Total disbursements		$4390.80
Balance on hand in Citizens Fidelity Bank and Trust Co., Louisville, Kentucky		37.35
		$4428.15

Louis Agassiz Fuertes Research Grant Fund (special gift) .... $ 500.00

ENDOWMENT FUND

Cash balance in savings account, Dec. 31, 1945		$ 390.38
Received during year		
Interest on U.S. bonds and on savings account	143.05	
Life Membership payments	947.00	
Total		$1480.43
Transferred to checking account (interest)	141.81	
Bank charge (State tax)	1.24	
Total		143.05
Balance		$1337.38
Bonds:		
U.S. Postal Savings Coupon Bonds, dated July 1, 1935		$ 780.00
U.S. Savings Bonds, Series C, dated Aug. 1, 1938 (maturity value, $1075.00)		989.00
U.S. Savings Bonds, Series G, dated Sept. 1, 1943 (maturity value, $1000.00)		951.00
U.S. Savings Bonds, Series G, dated Dec. 20, 1944 (maturity value, $1500.00)		1443.00
U.S. Savings Bonds, Series G, dated July 1, 1945 (maturity value, $900.00)		880.20
U.S. Savings Bonds, Series G, dated Oct. 1, 1945 (maturity value, $1400.00)		1369.20
Total Endowment Fund		$7749.78

Note: Bonds are now carried in our Endowment Fund at their present redeemable value rather than at their maturity value as heretofore.

Respectfully submitted,
BURT L. MONROE, *Treasurer*

December 31, 1946

Approved by Auditing Committee
Harold Wing
George H. Lowery, Jr.

ORNITHOLOGICAL LITERATURE

THE RUFFED GROUSE: ITS LIFE STORY, ECOLOGY AND MANAGEMENT. By Frank C. Edminster. The Macmillan Company, New York, 1947: 6 × 9¼ in., xxvi + 385 pp., 56 plates and 17 figures. $5.00.

Deservedly one of the most popular of American game birds, the Ruffed Grouse has been the subject of an extensive literature. Its life history, ecology, and management involve problems which have challenged investigators. In no volume previous to this one, however, has the species been treated so fully.

Mr. Edminster's preparation for writing this book includes seven years of intensive grouse study, much of it in the vicinity of Ithaca, New York, and a wider experience with the bird gained in his occupation as biologist with the Soil Conservation Service. His approach is broadly ecological, with special emphasis on food and cover requirements, inter-specific relationships, and management problems. Life history receives proper attention; techniques of grouse propagation are passed over lightly.

The core of the book concerns the ecology of the Ruffed Grouse—its shelter, food, and water requirements; its reactions to weather conditions; its relationships with other species, particularly those which are predatory upon it; its diseases and parasites; its productivity and the factors which influence populations; and finally its relations with man. Other chapters deal with classification, nomenclature, and description; an account of the history of the species in eastern United States; a "biography" of the bird; and a presentation of management problems.

The volume might well have been titled, or subtitled, differently, since virtually all the data and observations presented relate to the northeastern portion of the United States. There is no attempt to make the life history a definitive one, since the study does not apply directly to the species in other portions of its extensive range. Within the limits which the author himself sets, however, the treatment is comprehensive.

Data from many food habits studies are presented in tabular form and are discussed in the text. A list of the twenty-five most important plant foods of the grouse in eastern North America is given. In his discussion of cover requirements Edminster follows the sound principle of treating separately each of the northeastern forest types, and of discussing the grouse's adaptability to each, as well as to the changes which man has brought about.

In considering the puzzling problems of grouse "cycles," Edminster has drawn heavily upon the studies and publications of other investigators, upon Allen, Stoddard, Gross, King, Stoddart, Bump, and many more. He presents evidence of a significant correlation between periods of grouse decline and periods of unfavorable weather. From his study of weather data and of known "lows" in past grouse populations he concludes (page 193):

"If there is any certain connection between adverse weather and grouse decimations, it apparently is tied in with excessive snow in February and March, usually linked with extremely low temperatures, or with low temperatures in June . . . All of the notable grouse declines in New York since 1890, when the weather records began, can be explained by these conditions . . ."

Concerning predation, Edminster writes (page 215): "From all the data on hand, we must conclude that intensive predator control of any type, while it may be markedly effective in reducing nesting loss, will not produce a higher shootable fall population of grouse during years of high abundance. During years of low grouse numbers, the evidence shows that predator control may increase appreciably the fall grouse population. But even under these conditions, with the grouse population increasing anyway, the justification for deliberate predator control is very doubtful."

I confess to a distaste for interpretation of a wild animal's emotions, reactions, and behavior in human terms. Thus in Chapter 3, the author relates the biography of a grouse family in a highly anthropomorphic manner. On page 28, in an account of a young hen grouse's approach to a drumming male, the story runs: "The hen bird's heart was in her throat as she came closer. Then suddenly, as she peered around the end of an old windfall, she beheld the object of her search. It was the grandest grouse she had ever seen. She froze in her tracks." On page 34, the hen's emotions and reactions following mating are described: "As she walked easily along, no doubt daydreaming of the wonderful new world unfolding to her, she would pick up dead leaves and toss them over her shoulder in careless abandon." Interspersed in this fanciful account are the factual discussions of drumming, sex rhythm, incubation, and other important matters.

As is too frequently the case with present-day books, errors in makeup and faulty proof-reading are apparent. Many of the subheads are set in type identical with that of the body of the book though others are in boldface. On pages 88–89 some of the subheads are punctuated with colons, others with periods. On page 36 the scream of the Red-tailed Hawk is spoken of as "renting the soft air." Further, in my copy at least, there are many pages with imperfections or holes in the paper.

To voice another petty prejudice, if an author must use foreign words or phrases (e.g., *lebensraum* on page 44), I would be happy if he did not feel it necessary to translate them for me.

There is constant danger, however, that over-emphasis by a reviewer on matters of style and typographical imperfections will blind the reader to the real merits of a book. Mr. Edminster has produced an excellent volume, the most complete treatment available of this important game species. He has rendered real service to the science of ornithology and to the wildlife management profession. —Maurice Brooks.

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THE WILSON ORNITHOLOGICAL CLUB LIBRARY

The following gifts have been recently received. From:

W. J. Baerg—2 books, 5 reprints
Charles W. Kossack—1 reprint
Karl Lagler—19 reprints and bulletins
Arthur E. Staebler—2 reprints
O. A. Stevens—1 reprint
Wilson Tout—4 bulletins
Josselyn Van Tyne—1 book, 11 reprints
Lawrence H. Walkinshaw—1 reprint

Of particular interest among the recent gifts are: "General Ornithology Laboratory Notebook," by A. A. Allen, L. A. Fuertes, and M. D. Pirnie, 1927; "Elementary Ornithology," by W. J. Baerg (revised edition), 1941; "Life Histories of North American Diving Birds. Order Pygopodes," by Arthur Cleveland Bent (reprinting), 1946; "The Birds of Illinois and Wisconsin," by Charles B. Cory, 1909; "The Birds of Oklahoma," by Margaret Morse Nice (revised edition), 1931; and "Über die Vogelfauna der Binnengewässer Ålands," by Pontus Palmgren, 1936.

WILDLIFE CONSERVATION

Status of the Whooping Crane

Thirty-five years ago E. H. Forbush stated that "the Whooping Crane is doomed to extinction." According to Myron H. Swenk, who compiled so much valuable migration data in Nebraska, the most rapid decrease in the species in that State took place between 1890 and 1910. The year 1910 also seems to approximate the beginning of serious decline on the wintering grounds in Louisiana, but there was an earlier period of decline. By about 1800, for example, the Whooping Crane evidently was no longer observed on the Atlantic seaboard, and by the end of the nineteenth century it was gone from wintering areas east of the Mississippi.

We can find less than thirty of these magnificent birds alive today. Before discussing the status of this small remnant and our present efforts to prevent the long-threatened extinction of *Grus americana*, let us consider briefly some of the major reasons for its decline. They are fairly obvious. In a wild state, the Whooping Crane is a bird of vast open country. Its primitive breeding range appears to have included considerable portions of the central prairie region—northern Iowa, much of Minnesota, most of North Dakota, eastern Montana, and large areas in the prairie provinces of Manitoba, Saskatchewan, and Alberta. After the Civil War, as railroads were extended into much of this region, as lumbering became "big business" in Minnesota, as settlers moved rapidly into all the southern half of the area, great changes gradually took place in the environment. Drainage was soon intensive. Heavy cultivation of corn and grain crops followed. Vast breeding grounds of many of our waterfowl—and the best of the Whooping Crane nesting area—were soon gone. Prairie swales, marshes, and potholes that had produced a crop of young birds annually for countless years were suddenly destroyed.

Not only the breeding areas were affected by the Nation's expansion. In the heart of the Whooping Crane's wintering grounds, southwest Louisiana, and elsewhere on the Gulf Coast, there was a similar march of events. During the 1850's the first settlers had come to the interior prairie country of Louisiana. Cattle replaced bison; the wintering cranes and waterfowl provided a source of regular food for the pioneers. In the 'eighties came the railroad and more people. In the next decade the prairies were diked and plowed and became the country's new "rice bowl." The decline of many wildlife species, particularly the Whooping Crane, was rapid. In the 'nineties the only wintering range left to the cranes was the coastal marsh, where fur trapping had not yet become a general occupation. But the coastal strip was not sanctuary for long. When muskrat pelts went to one dollar and more in the 1920's the Whooping Cranes that wintered there were doomed. They lasted until about 1935.

Renewed interest in the fate of the Whooping Crane and more intensive coverage of the Gulf Coast by U.S. Fish and Wildlife Service and National Audubon Society personnel resulted in the "discovery" of only two wintering groups. In the winter of 1935–36 George B. Saunders reported fourteen Whooping Cranes on the St. Charles Ranch, Refugio County, Texas. The following winter this isolated coastal area was established as the Aransas Waterfowl Refuge by the (then)

U.S. Biological Survey. A second group of Whooping Cranes was found near White Lake, Vermilion Parish, Louisiana. The largest count here was made by John J. Lynch, U.S. Fish and Wildlife Service, who on May 15, 1939, saw eleven adults and two immatures.

In the spring of 1939 the known population consisted of eighteen birds in Texas (including four young-of-the-year) and thirteen in Louisiana (including two young-of-the-year). The Louisiana flock was resident. The continental total was then thirty-one Whooping Cranes.

There were two important welfare factors present on the Texas wintering grounds that were lacking in Louisiana: in Texas the Whooping Crane had literally thousands of acres of safe, adequate range that provided both protection and isolation. (An extension of the Intracoastal Waterway in 1940 threatened to cut through the best of this range, but the U.S. Engineers were persuaded to move the route so as to affect only six miles on the rim of the area instead of twelve miles right through the heart.)

In Louisiana a segment of the same waterway had been dredged in 1934 over a new route that crossed the deep marsh north of White Lake, destroying its isolation. Then, in the period from August 6 to 10, 1940, there was a rainfall which averaged twenty-two inches over that portion of the State. The water elevation at White Lake reached five feet above normal Gulf level. The flock of Whooping Cranes fled to the high ground near Gueydan or to near-by cheniers. When the flood subsided to normal (September 15), only three Whooping Cranes returned. It is likely that all ten missing birds had been shot. Within less than one month, possibly in a period of a few days, approximately thirty-three per cent of the known continental Whooping Crane population had been wiped out.

Today, with one or two birds left in Louisiana and twenty-five in Texas, the National Audubon Society and the U.S. Fish and Wildlife Service are cooperating in an effort to find some means of saving this splendid North American species from extinction. Conditions on the wintering grounds are being studied and welfare factors increased, possible destructive factors controlled. Migration routes are under scrutiny, and search is being continued for the unknown nesting grounds. —Robert P. Allen.

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